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TECHLAW INC.

October 24, 2002 DCN: RR7-TLI-07YX-01-TP-0466

Mr. Thomas Lorenz
U.S. Environmental Protection Agency
Region 7
Superfund Division
Federal Facilities and Special Emphasis Branch
901 North 5th Street
Kansas City, Kansas 66101

Re: EPA Contract No. 68-W-01-051; EPA Work Assignment No. 07-YX
TechLaw Project No. RR7-K07; St. Louis (ex) Army Ammunition Plant
Site Visit Trip Report/Sampling and Analysis Report - August 19-23 and 26-27, 2002

Dear Mr. Lorenz:

Enclosed is the Site Visit Trip Report/Sampling and Analysis Report for the St. Louis (ex) Army Ammunition Plant site. This report documents the activities performed by TechLaw Senior Geologist, Steve Bryant, on August 19-23 and 26-27, 2002.

If you have any questions regarding this submittal, please contact me at (913) 236-0006, extension 104 or Steve Bryant at extension 108.

Sincerely,

TechLaw, Inc.

Fred Molloy

Fred Molloy
Senior Project Manager

Enclosure

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Document Control

DCN: RR7-TLI-07YX-01-TP-0466

SITE VISIT TRIP REPORT/SAMPLING AND ANALYSIS REPORT
AUGUST 19-23 AND 26-27, 2002
ST. LOUIS (EX) ARMY AMMUNITION PLANT
ST. LOUIS, MISSOURI

Submitted to:

U.S. Environmental Protection Agency
Region 7
Superfund Division
Federal Facilities and Special Emphasis Branch
901 North 5th Street
Kansas City, Kansas 66101

Work Assignment No.:	07-YX
Contract No.:	68-W-01-051
Date Prepared:	October 24, 2002
Prepared By:	TechLaw, Inc. Steve Bryant (913) 236-0006 extension 108
TechLaw Project No.:	RR7-K07
EPA Primary Contact:	Thomas Lorenz
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1.0 Introduction

Under the Region 7 Regional Oversight Contract (ROC), Contract No. 68-W-01-051, TechLaw, Inc., (TechLaw) was tasked with providing technical assistance to the EPA Region 7, Superfund Division, Federal Facilities and Special Emphasis Branch. TechLaw was issued Work Assignment Number 07-YX to provide technical oversight support to EPA at the St. Louis (ex) Army Ammunition Plant (SLAAP) site in St. Louis, Missouri.

The report that follows documents TechLaw's site visit to SLAAP on August 19 through 23 and 26 through 27, 2002. Copies of the field logbook notes are included in Attachment 1. Field activities conducted by TechLaw included oversight and the collection of split samples as discussed in this report. In addition, field activities were conducted by U.S. Army Aviation and Missile Command (AMCOM)/U.S. Army Corps of Engineers (USACE) contractors, and numerous photographs were taken by TechLaw for documentation. Copies of the site photographs are included in Attachment 2.

2.0 Site Visit Activities

The objectives of the site visit were to: (1) conduct oversight and split sampling during the site-specific environmental baseline survey (SSEBS) activities conducted by AMCOM/USACE's contractor, URS Group, Inc., (URS) and their subcontractors; and (2) conduct oversight of activities related to the demolition of Building 3 by AMCOM/USACE's contractor, Arrowhead Contracting, Inc., (Arrowhead) and their subcontractors. TechLaw documented adherence to and deviations from EPA-approved work plans and performed photographic and logbook documentation as summarized below.

2.1 Site-Specific Environmental Baseline Survey Oversight and Split Sampling

From August 19 through 23 and 26 through 27, 2002, TechLaw Senior Geologist Steve Bryant, accompanied the EPA Work Assignment Manager (WAM), Thomas Lorenz, on a site visit of the SLAAP site.

TechLaw observed a variety of SSEBS activities including direct-push soil sampling, test pit trenching, hand auger soil sampling, drilling/monitoring well installation, pulverized concrete sampling, sewer wastewater and sediment sampling, and a video camera survey of the on-site sewer lines. URS personnel on-site included Bob Skach, Melissa Felton, Matt Phoenix, Gene Papinako, Mike Mason, Rich Parshall, Tim Smith, Lawrence Johnson, and Michelle Wernig. URS' on-site subcontractors included Below Ground Surface, Inc., (BGS) for direct-push soil sampling; Aquadrill, Inc., for well drilling/installation; and Odesco Industrial Services, Inc., (Odesco) for sewer wastewater and sediment sampling, and the video camera survey. Arrowhead, the Building 3 demolition contractor, provided management of investigation-derived waste (IDW), excavation, and concrete breaking/coring/sawing services to URS.

2.1.1 Direct-Push Soil Sampling

URS's subcontractor, BGS, conducted direct-push soil sampling for the SSEBS using a truck-mounted Geoprobe® hydraulic ram sampling unit. Numerous direct-push sampling locations were situated on concrete surfaces, requiring concrete coring and removal of concrete cores by Arrowhead to expose the soil surface prior to direct-push sampling. Soil cores were removed from the probe holes using a Geoprobe® Macrocore® Sampler and the lithology was logged by a URS technician. Information such as soil type, moisture content, relative soil density, and color, among others, was recorded on URS logging forms. Except for select sampling locations where additional soil volume was necessary for quality assurance and quality control samples, soil samples were generally collected by URS from 0 to 6 inches, 4 to 5 feet, and 9 to 10 feet below ground surface (bgs). Sample aliquots for volatile organic compounds (VOCs) were collected by URS directly from the soil core using an En Core® Sampler. Following collection of the VOC sample, the remaining soil from the desired depth interval was homogenized in a decontaminated stainless steel bowl using a decontaminated stainless steel spoon. Aliquots for other analyses (depending on location) such as polychlorinated biphenyls (PCBs), polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans (PCDD/PCDFs), semi-volatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), total metals including mercury, pesticides, explosives, total petroleum hydrocarbons (TPH) as diesel range organics (DRO) and gasoline range organics (GRO) were then placed into appropriate containers, labeled, and placed on ice in coolers for shipment to URS' analytical laboratory, TriMatrix Analytical Laboratories, Inc., (TriMatrix) in Grand Rapids, Michigan.

TechLaw collected three split soil samples (Sample Nos. 1641-101, 1641-102, and 1641-106) from three URS direct-push sampling locations as summarized in Table 1 and shown on Figures 1 and 2. TechLaw split sample containers were filled by URS personnel contemporaneously with URS samples. Aliquots for low-level VOC analyses were collected first using cut-off five cubic centimeter volume syringes to obtain the aliquot from the same soil core interval as the URS VOC aliquot collected with an En Core® Sampler. Approximately 5 grams of soil was placed from the syringe into each of two pre-weighed 40 milliliter (ml) volatile organic analysis (VOA) vials containing approximately 5 ml of sodium bisulfate preservative. Two unpreserved 40 ml VOA vials were also filled with soil by URS for percent solids analyses in conjunction with the low-level VOC analyses. Following sample homogenization by URS in a decontaminated stainless steel bowl using a decontaminated stainless steel spoon, the aliquots for SVOCs, PCBs (aliquots for SVOC and PCB analyses were combined into one container) and PCDD/PCDFs were then placed into two unpreserved 8-ounce glass jars by URS. Filled split sample containers were handed to Steve Bryant of TechLaw for labeling. After labeling, the split sample containers were placed into a cooler with ice for shipment to the EPA Region 7 Environmental Services Division (ENSV) Laboratory in Kansas City, Kansas.

The soil core from URS sampling location 01SB-04 (TechLaw split Sample No.1641-106) beneath the concrete floor of a sump near the southwest interior corner of Building 1 was visibly contaminated. Moderate to strong petroleum hydrocarbon odors and black-stained soil was observed in the soil core from immediately beneath the sump to approximately 6 feet beneath the sump. URS

did not conduct field head space screening of organic vapors in the visibly-contaminated soil because they had no organic vapor monitoring equipment on-site. Other than the visible soil contamination in URS sampling location 01SB-04, direct-push sampling activities, observed by TechLaw, did not note any visibly contaminated soil.

It should be noted that TechLaw observed only a limited amount of the overall direct-push soil sampling that was being conducted during the SSEBS. However, based on observations made by TechLaw from August 19 through 23 and 26 through 27, the direct-push soil sampling was conducted in accordance with URS' EPA- and Missouri Department of Natural Resources (MDNR)-approved Sampling and Analysis Plan for the SSEBS, dated July 2002.

2.1.2 Test Pit Trenching and Hand Auger Soil Sampling

Test pit trenches were excavated by Arrowhead at select locations of former rotary furnaces in Building 2. Excavation, along with breaking and removal of the concrete foundations, was necessary to expose soil for hand auger sampling beneath the concrete foundations of the rotary furnaces, and other utility trenches that had been previously filled with debris such as bricks, wood, and other materials. TechLaw observed URS personnel collecting subsurface soil samples from test pit trenches in Building 2 from which TechLaw collected three split soil samples (1641-103, 1641-104, and 1641-105) as summarized in Table 1 and shown on Figure 3. URS obtained soil from 0 to 6 inches below the concrete using hand auger methods. The bucket attachment of the hand auger was decontaminated by URS prior to collecting samples at each location. URS placed decontamination water into 55-gallon drums, sealed, labeled, and staged on plastic sheeting in Building 1 pending analytical results. Soil was removed from the desired sampling interval and placed into a decontaminated stainless steel bowl for homogenization. TechLaw split sample containers were filled by URS personnel contemporaneously with URS samples. Aliquots for low-level VOC analyses were collected first using cut-off syringes to obtain the aliquot from the same location as the URS VOC aliquot collected with an En Core® Sampler. Approximately 5 grams of soil was placed from the syringe into each of two pre-weighed 40 ml VOA vials containing approximately 5 ml of sodium bisulfate preservative. Two unpreserved 40 ml VOA vials were also filled with soil by URS for percent solids analyses in conjunction with the low-level VOC analyses. Aliquots for SVOCs, PCBs (aliquots for SVOC and PCB analyses were combined into one container) and PCDD/PCDFs were then placed into two unpreserved 8-ounce glass jars by URS. Filled split sample containers were handed to Steve Bryant of TechLaw for labeling. After labeling, the split sample containers were placed into a cooler with ice for shipment to the EPA Region 7 ENSV Laboratory in Kansas City, Kansas.

No evidence of visibly-contaminated soil was observed by TechLaw during the hand auger sampling by URS in Building 2. It should be noted that TechLaw observed only a limited number of hand auger sampling locations in Building 2. Based on TechLaw's observations, hand auger sampling by URS appeared to be in accordance with the EPA- and MDNR-approved SSEBS SAP.

2.1.3 Drilling/Monitoring Well Installation

URS' subcontractor, Aquadrill, used a truck-mounted cable-tool rig (Bucyrus-Erie) equipped with a four-foot long, six-inch inside diameter (ID) drive barrel sampler at each of the four new overburden monitoring well locations (3MW-1, 8MW-1, 8MW-2, and 8MW-3). URS Geologist Gene Papinako logged continuous soil cores obtained from the barrel sampler and recorded information such as soil type, moisture content, relative soil density, and color, among others, on URS logging forms. No soil samples were collected from the borings and no organic vapor screening of soil head space was conducted by URS. Dry weathered shale was encountered at depths ranging from approximately 17 to 22 feet bgs in each of the four borings. In general, the portion of the soil cores from 3MW-1 and 8MW-3 observed on August 20 by TechLaw were dry. According to Mr. Papinako, water was not encountered during advancement of 3MW-1 and 8MW-3 except in a gravel fill layer approximately 6 inches thick immediately below the surficial asphalt cover.

Based on this information, on August 21, URS requested a deviation to the SSEBS SAP from EPA and MDNR to not install wells and abandon the borings due to dry subsurface conditions. While waiting for approval from EPA/MDNR, URS directed BGS to conduct direct-push sampling near the locations of 8MW-1 and 8MW-2 to evaluate the subsurface conditions relative to water-bearing zones. Based on URS' observations of the direct-push soil cores near 8MW-1 and 8MW-2, no water-bearing zones were encountered. However, the direct-push soil core from near 8MW-2 was visibly contaminated. Moderate to strong petroleum hydrocarbon odors and black-stained soil was observed in the soil core from approximately 10 to 12 feet bgs. URS did not collect any samples of the visibly-contaminated soil. In addition, URS did not conduct field head space screening of organic vapors in the visibly-contaminated soil because they had no organic vapor monitoring equipment on-site.

A teleconference on August 21 between representatives of EPA, USACE, URS, and TechLaw included discussions of the subsurface conditions encountered. It was determined that because oversight of SLAAP activities is the responsibility of MDNR, the decision to abandon the borings and not install wells would be made by Jim Harris of MDNR, who did not participate in the teleconference. In anticipation that MDNR would not require installation of these wells, on August 21, URS directed Aquadrill to abandon 3MW-1 and 8MW-3 by filling the open boreholes to the surface with bentonite.

On August 22, URS representative Melissa Felton stated that URS had received notification via e-mail from Mr. Harris that MDNR would not approve a deviation to the SSEBS SAP regarding the installation of the overburden monitoring wells. Based on this information, URS subcontractor, Aquadrill, returned to 3MW-1 and 8MW-3 between August 23 and August 25, offset approximately 10 feet north and west, respectively, from the original locations to drill and install the wells. The drilling and installation of wells at these new locations was not observed by TechLaw.

A portion of the drilling and installation of well 8MW-2 by Aquadrill was observed by TechLaw on August 22. Consistent with the direct-push soil core obtained nearby on August 21, moderate to

strong petroleum hydrocarbon odors and black-stained soil was observed in the soil core from approximately 10 to 12 feet bgs. URS did not collect any samples of the visibly-contaminated soil or conduct field head space screening of organic vapors in the visibly-contaminated soil. A two-inch diameter, Schedule 40 polyvinyl chloride (PVC) well screen with 0.01-inch slots, 10 feet in length with a PVC end cap was set at approximately 21 feet bgs. A blank two-inch diameter Schedule 40 PVC riser pipe extending to the ground surface was connected to the well screen. Filter pack material consisting of 20/40 sand was placed by tremie pipe from the bottom of the well to approximately three feet above the top of the well screen. A bentonite seal approximately three feet thick consisting of hydrated bentonite pellets, was placed above the filter pack by pouring from the ground surface. TechLaw did not observe grout placement or installation of the flush-mount well vault.

TechLaw did not collect split samples of any media during or following well installation activities. It should also be noted that TechLaw observed only a limited amount of borehole advancement and logging of soil cores from well locations 3MW-1, 8MW-2, and 8MW-3, and did not observe any well installation activities other than 8MW-2. However, based on limited observations made by TechLaw, drilling and well installation by URS and their subcontractor appeared to be in accordance with the EPA- and MDNR-approved SSEBS SAP.

2.1.4 Pulverized Concrete Sampling

URS collected numerous pulverized concrete samples as part of the SSEBS. TechLaw observed the collection of several pulverized concrete samples from oily-stained concrete surfaces in Building 2.

It should be noted that Section 5.5 of URS' SSEBS SAP stated that concrete cores, not less that one-inch in diameter, would be obtained from the depth intervals of 0 to 1-inch and 2 to 3 inches, saw-cut into individual sections, and pulverized by the analytical laboratory. However, as stated in URS' Modifications to the Work Plan-August 26, 2002, Item No. 1 (approved by EPA and MDNR), because URS' analytical laboratory does not have concrete pulverizing capabilities, a hammer drill was used to pulverize the concrete in the field. In addition, as also stated in URS' Modifications to the Work Plan, Item No. 2, the concrete samples in Building 2 were to be collected from 0 to 1 inch only. The concrete sampling observed by TechLaw in Building 2 appeared to be in accordance with the EPA- and MDNR-approved SSEBS SAP modifications.

TechLaw collected six split pulverized concrete samples (1641-11, 1641-12, 1641-13, 1641-14, 1641-15, and 1641-16) as summarized in Table 2 and shown on Figure 3. At each sample location, an area of approximately one-foot by one-foot was delineated by URS personnel. Surficial dust and debris was removed from each sampling area by URS prior to concrete drilling. Arrowhead personnel then used a hammer drill with a decontaminated drill bit at each sampling area to pulverize the concrete surface from the 0 to 1-inch depth interval in numerous locations within a one-foot by one-foot sampling area. URS personnel then placed the pulverized concrete into a decontaminated stainless steel bowl and homogenized the material prior to placing it into appropriate sample

containers. TechLaw split sample containers were filled by URS personnel contemporaneously with URS samples. Aliquots for SVOCs, PCBs (aliquots for SVOC and PCB analyses were combined into one container) and PCDD/PCDFs for the split sample were placed into two unpreserved eight-ounce glass jars by URS. Filled split sample containers were handed to Steve Bryant of TechLaw for labeling. After labeling, the split sample containers were placed into a cooler with ice for shipment to the EPA Region 7 ENSV Laboratory in Kansas City, Kansas.

2.1.5 Sewer Wastewater and Sediment Sampling, and Video Camera Survey

URS and their subcontractor, Odesco, collected samples of wastewater and sediment from the interior of various on-site sewer manholes. In addition, Odesco conducted a video camera survey of main on-site sewer lines. TechLaw observed only limited sewer-related activities and did not collect any split sewer wastewater or sediment samples. According to URS representatives, all of the planned wastewater and sediment samples could not be collected due to insufficient quantities of these materials in the sewers. Based on TechLaw's observations, and with the exception of fewer samples being collected, it appeared that sewer-related activities by URS were conducted in accordance with the EPA- and MDNR-approved SSEBS SAP.

2.1.6 Other Notable Issues

During SSEBS oversight and split sampling activities, additional environmental issues were discovered at the SLAAP site. A description of these issues is presented below.

Building 2 - Oily Liquid in Exposed Electrical Conduit and Electrical Switch Boxes

During the process of breaking the concrete surfaces in Building 2, by Arrowhead prior to URS soil sampling, a black oily liquid dripping from an electrical conduit embedded in concrete was observed by Mr. Lorenz. The conduit contained numerous wires with the oily liquid inside and was embedded in the concrete slab foundation of the building at a depth of approximately 6 inches below the surface. The conduit had been severed while breaking concrete near the south-central portion of the building interior, allowing minimal quantities of the oily liquid (estimated at less than one-tenth of a gallon) to drip onto broken concrete surfaces. Because it was embedded in the concrete slab of the building, the extent of the conduit is unknown.

Mr. Lorenz also observed a similar black oily liquid on and around electrical switch boxes in the mezzanine on the west side of the building. Minimal amounts of the liquid (estimated to be less than two square feet in areal coverage) had dripped from switch boxes onto metal and concrete surfaces beneath the switch boxes.

Based on these observations, Mr. Lorenz recommended that URS collect wipe samples of the oily liquid in both locations for PCB analysis, with contingent dioxin analysis for the sample collected

in the mezzanine. This request was addressed in URS' Modification to the Work Plan-August 26, 2002 (Item No. 9) and agreed to collect wipe samples as recommended. If possible, URS will also collected a product sample from one of the switch boxes for PCB analysis.

Building 2 - Oily Liquid in Pipe Near the Interior Southeast Corner

During SSEBS preparation activities by URS during the week of August 12, URS discovered an oil-filled pipe near a sump in the southeast corner of Building 2. In URS' Modifications to the Work Plan dated August 16, 2002 (Item No. 8), they proposed to collect a sample of the oily liquid for TPH DRO, TPH GRO, and PCBs. Sample 02PD-01-0802 was collected by URS from location 02PD-01 on August 27. TechLaw collected a split sample of this liquid (Sample No. 1641-1) for low-level VOCs, SVOCs, PCBs, (aliquots for SVOCs and PCB analyses were combined into one container) and PCDD/PCDFs as summarized in Table 3 and shown on Figure 3. URS collected this sample by lowering a clean polyethylene container into the liquid and retrieving the container. The sample containers for both the URS and TechLaw samples were filled in contemporaneously by the URS field technician so that the sample was evenly distributed between the containers.

SAP Modifications

During the course of the SSEBS, URS encountered field conditions that have warranted modifications to the SSEBS SAP. These modifications were outlined in four separate modification memoranda by URS, each containing numerous individual modifications. The URS modifications are included in Attachment 3. Each modification was approved by EPA and MDNR.

2.2 Building 3 Demolition Activities

The objective of the site visit was also to provide oversight of Building 3 demolition activities and to document adherence to and deviations from EPA-approved work plans. TechLaw performed photographic and logbook documentation of Building 3 demolition as summarized below. No split samples associated with the Building 3 demolition were collected by TechLaw. Prior to the site visit beginning on August 19, Arrowhead had removed approximately 17,000 linear feet of asbestos-containing pipe insulation. Approximately 3,000 linear feet of PCB-contaminated cast-iron sewer piping was removed as special waste from the basement of Building 3. In addition, approximately 5,000 square feet of asbestos-containing floor tile was removed from interior locations on the first floor of Building 3. Removal of the asbestos-containing pipe insulation, floor tile, and sewer piping was not observed by TechLaw. TechLaw also briefly observed removal of fluorescent light ballasts and bulbs from areas on the west end of the second floor by Spirtas Wrecking Company (Spirtas) technicians prior to beginning demolition of interior portions of the building. Spirtas is a subcontractor to Arrowhead.

Removal of asbestos-containing non-friable transite panels from the east end of Building 3 by Spirtas was periodically observed by TechLaw. The removal procedure initially observed by TechLaw

involved Spirtas technicians burning off steel bolt-heads that attached the transite panels to the structural steel of the building using an oxy-acetylene torch, then removing each individual panel, and lowering the panel into a six-mil thick polyethylene-lined roll-off container for transport and disposal. On August 22, Mr. Lorenz, Mr. Harris, and Mr. Bryant observed Spirtas technicians dropping transite panels from a height of approximately 20 feet, resulting in broken transite panels, thereby making them friable. This procedure did not follow the EPA- and MDNR-approved *Addendum No. 1 to the Removal Action Work Plan, PCB Waste, Building 3 Toxic Substance Control Act (TSCA)* (Addendum) and was also a potential violation of EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 Code of Federal Regulations Part 61) Category II nonfriable regulated asbestos-containing material removal practices. Ben Williams of Arrowhead was verbally notified by Mr. Harris that Spirtas should immediately discontinue dropping transite panels or be subject to potential unspecified regulatory enforcement actions. Mr. Williams notified Spirtas which ceased transite removal actions for the day. Except for an apparent accidental dropping of two transite panels by Spirtas technicians observed by TechLaw on August 26, transite removal procedures by Spirtas appeared to be in accordance with the procedures outlined in the Addendum and NESHAP-required removal procedures following the August 22 notification to Spirtas of potential regulatory enforcement actions.

Window putty material in Building 3 was also determined to contain asbestos but will not be removed, in accordance with the Addendum. However, according to this Addendum, windows with the asbestos-containing putty are to be extracted during demolition and shipped to a certified scrap recycler. On August 22, Mr. Harris informed TechLaw that he observed windows on the second floor at the west end of Building 3 being pushed out with heavy equipment operated by Spirtas technicians during demolition of interior building materials and not individually extracted. Mr. Harris notified Greg Wallace of Arrowhead via e-mail that these procedures were not in accordance with the EPA- and MDNR-approved work plan, and that the windows should be individually removed rather than being pushed out. Observations of Building 3 demolition activities by TechLaw on August 26 and 27 could not confirm that the windows were being individually extracted.

Additional demolition activities observed by TechLaw included Spirtas pushing interior demolition debris such as wallboard, ceiling tiles, insulation, among others, out the west end of the second floor into the roadway for later removal.

3.0 Split Sample Analytical Results

Analytical results for the split samples collected by TechLaw are discussed in the following sections, and summarized in Tables 1 through 3. In addition, the analytical data package is included in Attachment 4.

3.1 Soil Samples

Analytical results for split soil samples indicated the presence of PCDD/PCDFs and PCBs (Aroclor 1248 and 1254) in the three soil samples collected in Building 2 (Sample Nos. 1641-103 through 1641-105). Analytical results are summarized in Table 1. The analytical results indicate concentrations for 2,3,7,8-dioxin Total Equivalents (TE) above EPA Region 9 Preliminary Remediation Goals (PRGs) for direct contact exposure pathway values in residential and industrial soil, and Superfund Chemical Data Matrix (SCDM) soil exposure pathway values for Cancer Risk (CR) and Reference Dose (RfD). A comparison of data with the PRGs and SCDM values is intended for health-based benchmark screening purposes only.

Concentrations of 2,3,7,8-dioxin TE ranged from 4.96 to 468 nanograms per kilogram (ng/kg). In addition, several other PCDD/PCDFs were reported. It is noted that the 2,3,7,8-dioxin TE values are less than the 5,000 to 20,000 micrograms per kilogram (µg/kg) range for dioxin cleanup levels in industrial soil at Superfund sites as stated in Office of Solid Waste and Emergency Response (OSWER) Directive No. 9200.4-26, entitled *Approach for Addressing Dioxin in Soil at Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Resource Conservation and Recovery Act (RCRA) Sites*, dated April 13, 1998. The PCB Aroclor 1248 ranged from less than 40 µg/kg to 3,600 µg/kg and Aroclor 1254 ranged from less than 40 µg/kg to 1,900 µg/kg.

The following SVOCs [polycyclic aromatic hydrocarbons (PAHs)] were reported in the soil sample collected from the roadway between Buildings 5 and 6 (Sample No. 1641-101): benzo(a)anthracene at 760 µg/kg; benzo(a)pyrene at 740 µg/kg; benzo(b)fluoranthene at 720 µg/kg; and indeno(1,2,3-cd)pyrene at 650 µg/kg. Other SVOCs were also reported in this sample, but at concentrations below health-based benchmarks. It should be noted that reporting limits for SVOCs in Sample Nos. 1641-104 through 1641-106 were elevated due to interference. Several of the elevated reporting limits are above their respective PRG or SCDM CR and RfD value. Therefore, it is not possible to determine if several SVOCs are present above regulatory screening health-based benchmarks in these samples. During soil sampling, it was noted that Sample No. 1641-106, collected from beneath the sump near the southwest corner of Building 1, was visibly contaminated as discussed in Section 2.1.1. Due to the elevated reporting limits, the exact concentrations of SVOCs in these samples cannot be determined.

Cis-1,2-dichloroethene at 12 µg/kg and trichloroethene at 27 µg/kg in Sample No. 1641-101 and estimated concentrations of acetone at 67 µg/kg and 2-butanone at 19 µg/kg in Sample No. 1641-105 were the only VOCs reported. The reported concentrations, however, were below health-based benchmarks. As stated in Section 3.4, because the daily instrument calibration did not meet the accuracy specifications, the actual concentration for acetone and 2-butanone may be as much as 32 percent (%) and 29% higher, respectively, than the reported values.

3.2 Concrete Samples

Analytical results indicate the presence of PCDD/PCDFs, PCBs (Aroclor 1248 and Aroclor 1260), and SVOCs in concrete samples collected in Building 2. Analytical results are summarized in Table 2. Because demolition of Building 2 has been proposed, the data were compared against EPA Region 9 PRGs and SCDM CR and RfD values, although no specific regulatory health-based benchmarks exist for these compounds in concrete. As presented in Table 2, concentrations of PCDD/PCDFs, PCBs, and SVOCs in concrete are above their respective regulatory screening benchmarks for soil.

Concentrations of 2,3,7,8-Dioxin TE from the six concrete samples ranged from 7.13 to 7,130 ng/kg. In addition, several other PCDD/PCDFs were reported in five of the six concrete samples. Aroclor 1248 ranged from estimated concentrations of 0.32 to 12 milligrams per kilogram (mg/kg) and Aroclor 1260 ranged from non-detect to 0.41 mg/kg.

The following SVOCs (PAHs) were reported in concrete Sample No. 1641-11: benzo(a)anthracene at 0.718 mg/kg; benzo(a)pyrene at 0.651 mg/kg; and benzo(b)fluoranthene at 0.754 mg/kg. The following SVOCs (PAHs) were reported in concrete Sample No. 1641-14: benzo(a)pyrene at 0.56 mg/kg; and benzo(b)fluoranthene at 1.11 mg/kg. Other SVOCs were reported in these samples but at concentrations below health-based benchmarks.

3.3 Oil Sample

Analytical results, summarized in Table 3, indicate the presence of PCDD/PCDFs, PCBs, and SVOCs in the oil sample collected in Building 2. The following PCDD/PCDFs were reported: 1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin at 418 ng/kg; 1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin at 4,670 ng/kg; 1,2,3,4,6,7,8-heptachlorodibenzo-p-furan at 285 ng/kg; 1,2,3,4,6,7,8,9-octachlorodibenzo-p-furan at 552 ng/kg; and 2,3,7,8-dioxin TE at 12.3 ng/kg. Aroclor 1248 was reported at an estimated concentration of 7.8 mg/kg, below the TSCA 50 mg/kg definition of PCB contamination. The following SVOCs were reported: benzo(a)fluoranthene at 22.5 mg/kg; bis(2-ethylhexyl)phthalate at 55.8 mg/kg; and N-nitrosodiphenylamine at 26.7 mg/kg.

3.4 Data Validation and Laboratory Comments Regarding Results

The EPA Region 7 ENSV Laboratory conducted all analyses and validated all split samples results obtained by TechLaw. Data validation was conducted by the EPA Region 7 ENSV Laboratory prior to releasing the data to TechLaw in accordance with the following documents: *Test Methods for Evaluating Solid Wastes, SW-846, Final Update III*, dated June 1997; and *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (Functional Guidelines), dated October 1999 .

The results of the data quality assessment by the EPA Region 7 ENSV Laboratory are as follows:

Data Completeness: This package was complete and legible. All data was usable as reported.

PCBs in Hazardous Waste by Gas Chromatography/Electron Capture (GC/EC): All samples had a least one of the two surrogates with a recovery outside the applicable upper control limit. The elevated recoveries were believed to be due to matrix effects and the nature of the samples. According to the data comments from the EPA Region 7 ENSV Laboratory, all aroclors, except Aroclor 1248, were non-detect in all samples. However, Aroclor 1260 was detected in Sample No. 1641-15 and Aroclor 1254 was detected in Sample No. 1641-104. Aroclor 1248 was found in all of the samples, and the reported values have been qualified as estimated (J-code) based on the high surrogate recoveries.

PCBs in Soil by GC/EC: The reporting limits were elevated in Sample No. 1641-104 (10 times) due to dilutions. The value of Aroclor 1254 in Sample No.1641-105 was estimated based on high surrogate recoveries (94%).

PCDD/PCDF in Soil by Gas Chromatography/High Resolution Mass Spectrometry (GC/HRMS): The Toxicity Equivalency Factors used to calculate the 2,3,7,8-dioxin TE were obtained from the World Heath Organization (WHO) 1997. The TE value is the sum of only positive concentrations multiplied by the individual toxic equivalency factor. Non-detect (U-code) values were not used in the calculation of TE.

All detected tetrachlorodibenzo-p-furan values are estimated (J-code). These results have not been confirmed by a secondary column due to time constraints. These estimated values were used when calculating the TE, resulting in worst case values, which may be biased high.

Results for 1,2,3,4,6,7,8-heptachlorodibenzo-p-furan and 1,2,3,4,6,7,8,9-octachlorodibenzo-p-furan in Sample No.1641-104 have been estimated (J-code) due to possible diphenyl ethers present in the sample. The results for these compounds could be biased high.

The ion ration for 1,2,3,4,7,8-hexachlorodibenzo-p-dioxin was not within the required limits in Sample No. 1641-104. An estimated maximum possible concentration (EMPC) was calculated according to SW-846 Method 8290 and the value was estimated (J-code).

Because the TE was calculated from estimated values due to interference, co-elution, and unconfirmed TCDF values, they are themselves estimated and are worst case values which may be biased high.

Analysis of spiked samples indicated high recoveries for 1,2,3,4,6,7,8-heptachlorodibenzo-p-furan. This problem may have been caused by matrix interference in the sample. The reported result in sample 1641-103 for this compound has been estimated (J-code), indicating that the results could be biased high by approximately 25%.

SVOCs in Hazardous Waste: At least two of the three acid surrogates in Sample Nos. 1641-12 through 1641-16 had recoveries below the lower control limits. The base neutral surrogates had acceptable recoveries. The one low acid surrogate recovery in Sample No. 1641-11 did not warrant invalidation of the non-detects. However, due to the very low acid surrogate recoveries in Samples Nos. 1641-12 through 1641-16, the acid compounds which were reported as non-detect in these samples were invalidated (i.e., I-code).

SVOCs in Soil: The reporting limits are elevated in Sample Nos. 1641-104 (30 times), 1641-105 (10 times), and 1641-106 (20 times) because of interference.

Slight bis(2-ethylhexyl)phthalate contamination was found in the laboratory method blank. Only samples containing this compound at a level greater than ten times the contamination level of the blank were reported without being qualified. All samples that contained this compound at levels less than ten times the contamination in the blank are shown with a "U-code" indicating the method reporting limit was raised to the level found in the sample. Samples affected were 1641-101 and 1641-103.

VOCs in Soil at Low Levels by Gas Chromatography/Mass Spectrometry (GC/MS) Closed-System Purge-and-Trap: Acetone was estimated (J-code) in Sample No. 1641-105. Although the analyte in question has been positively identified in the sample, the quantitation is an estimate due to the initial instrument calibration curve not meeting linearity specifications.

Acetone and 2-butanone were estimated (J-code) in Sample No. 1641-105. Although the analytes in question has been positively identified in the sample, the quantitations are estimated due to the daily instrument calibration not meeting accuracy specifications. The actual concentration for these analytes may be as much as 32% and 29% higher, respectively, than the reported values.

Results for 1,2-dibromo-3-chloropropane in Sample Nos. 1641-101, 1641-102, 1641-103, 1641-104, 1641-105, 1641-106, and1641-107FB were invalidated due to unacceptably low initial and continuing relative response factors.

Slight acetone contamination was found in the laboratory method blank. Only samples containing this compound at a level greater than ten times the contamination level of the blank were reported without being qualified. All samples that contained this compound at levels less than ten times the contamination in the blank are shown with a "U-code" indicating the method reporting limit was raised to the level found in the sample. Samples affected were: 1641-101, 1641-103, 1641-104, and 1641-105.

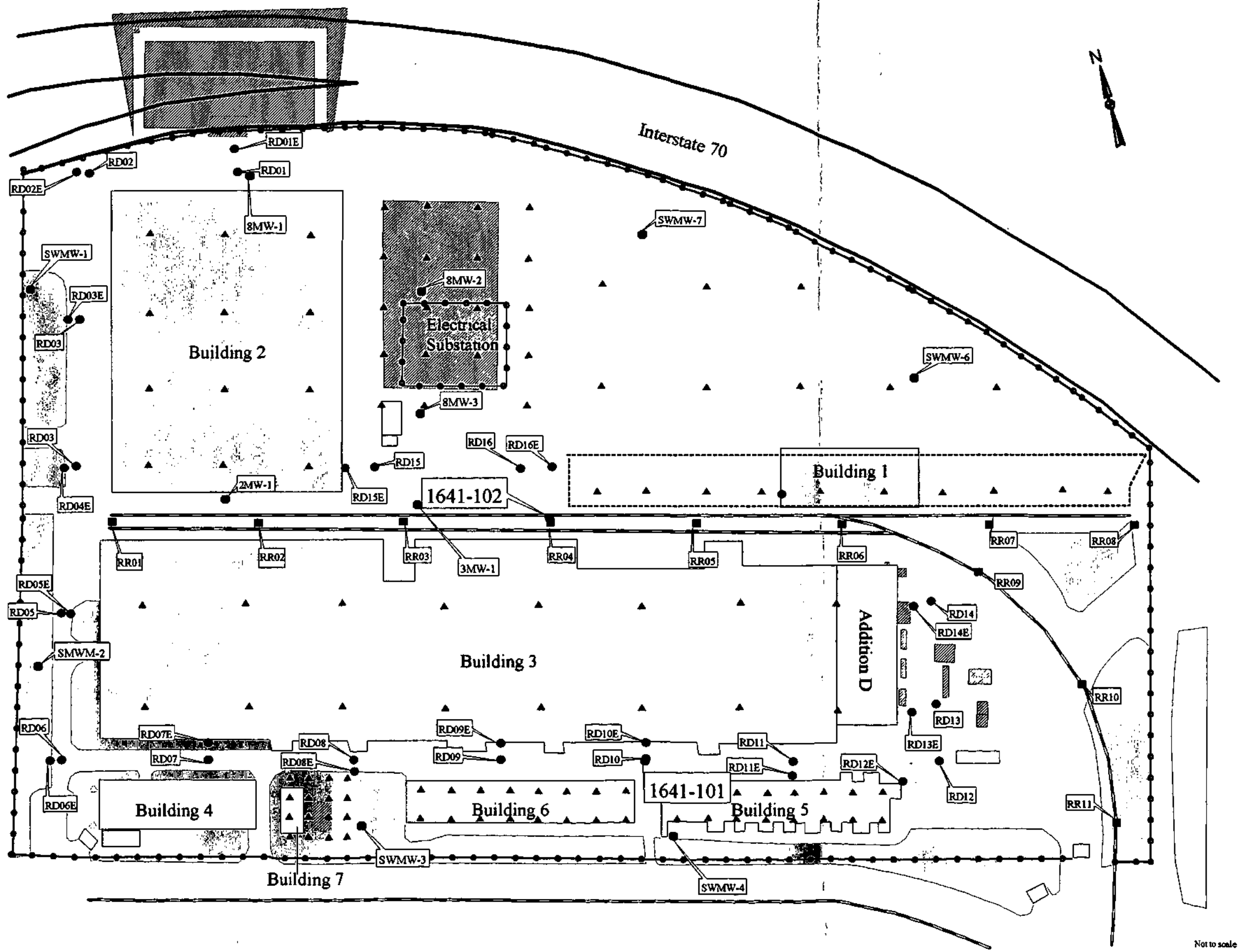
VOCs in Solid Hazardous Matrices by GC/MS: Due to the nature of the sample, an aliquot of the oil was weighed out and then analyzed. Therefore, results are reported in units of mg/kg.

FIGURES

Figure 1

URS Systematic Risk Assessment Sampling Locations and EPA Split Sampling Locations

St. Louis (ex) Army Ammunition Plant
St. Louis, Missouri



- EPA Split Sample Locations
- Monitoring Well Locations
- Road Sample Locations
- Railroad Sample Locations
- ▲ RA-01SB-01 through 10
- ▲ RA-02SB-01 through 12
- ▲ RA-03SB-01 through 15
- RA-04SB-01 through 10
- ▲ RA-05SB-01 through 16
- ▲ RA-06SB-01 through 16
- ▲ RA-07SB-01 through 16
- ▲ RA-08SB-01 through 20
- ▲ RA-NESB-01 through 08

Buildings Removed

- 1944 to 1958 Fuel Oil Storage
- 1958 to 1965 Fuel Oil Storage
- Building 7A (Former Cooling Tower)
- Building 8
- Building 8A
- Building 9 (Acetylene Generator)
- Building 9A (Carbide Storage)
- Building 9C (AST Driox Oxygen Receiver)
- Building 9D (Driox Oxygen Convertor)
- Building 11A
- Building 11B
- Gasoline Dispenser
- Gasoline UST
- Quench Oil Tanks

- Sludge Pits

- Existing Buildings
- Grass Areas

- Electrical Substation
- Former Storage Yard
- Fenceline
- Railroad

Prepared By

TechLaw, Inc.

Information taken from URS drawing, July 2002

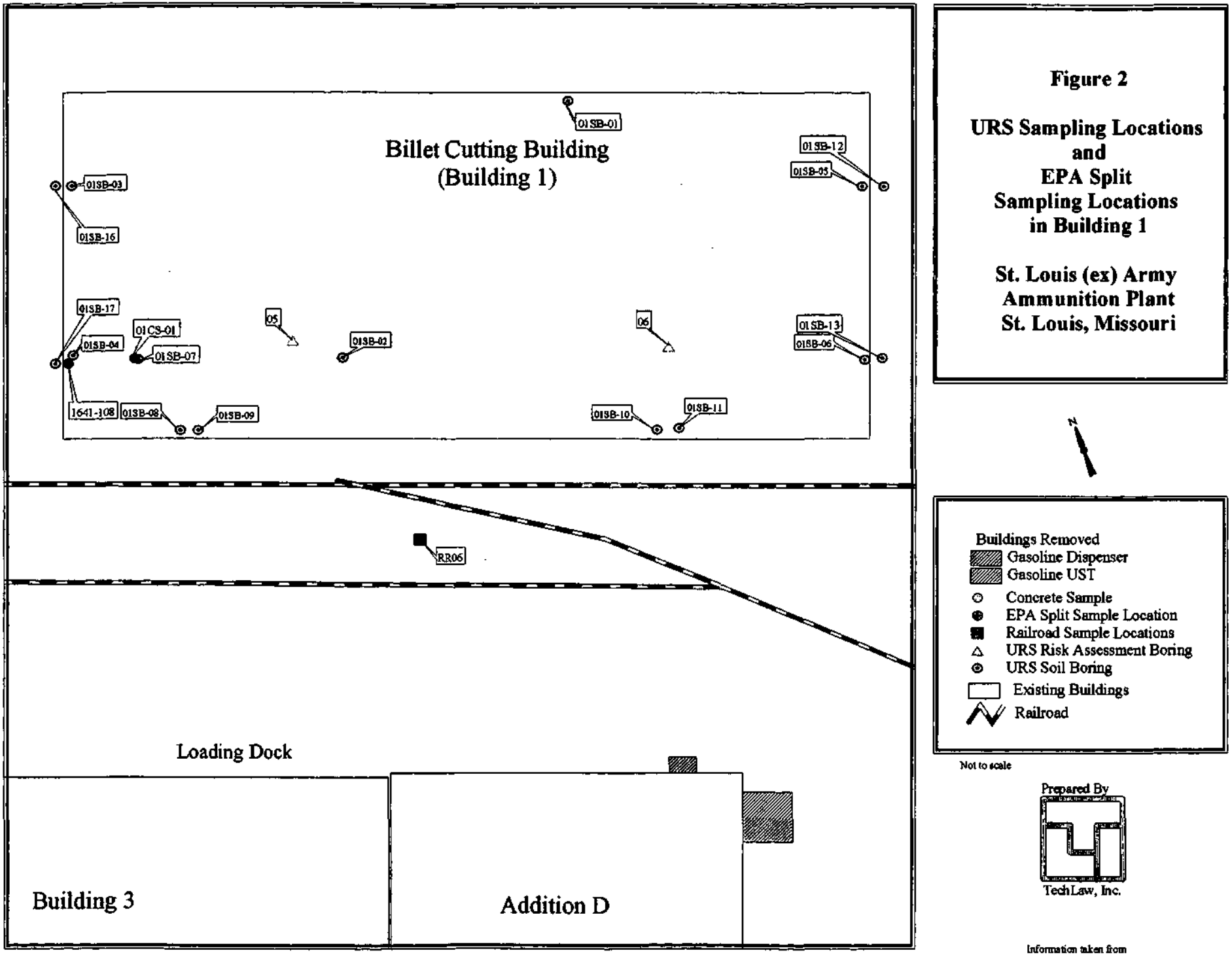
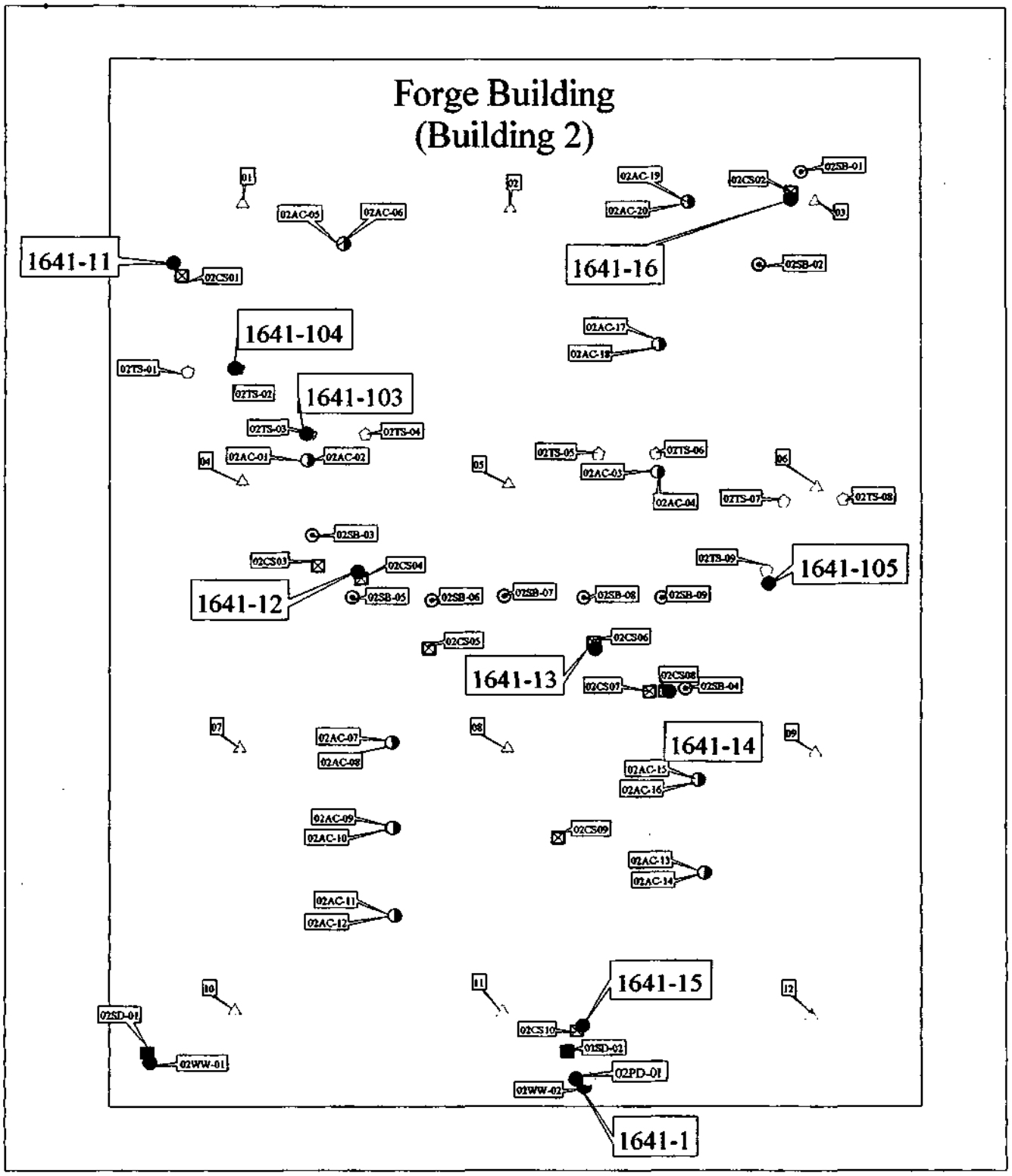


Figure 2

URS Sampling Locations and EPA Split Sampling Locations in Building 1

St. Louis (ex) Army Ammunition Plant
St. Louis, Missouri



- EPA Split Sample Locations
- URS ACM Sample Locations
- URS Concrete Samples
- URS Oil Sample
- URS Risk Assessment Boring
- URS Sediment Sample Location
- URS Soil Boring
- URS Test Pit
- URS Wastewater Sample

Not to scale

Figure 3
URS Sampling Locations
and
EPA Split Sampling Locations
in Building 2

St. Louis (ex) Army Ammunition Plant
St. Louis, Missouri

Prepared By
TechLaw, Inc.

Information taken from
URS drawing, July 2002

TABLES

Table 1
SUMMARY OF DETECTED COMPOUNDS
SPLIT SOIL SAMPLES 1641-101 THROUGH 1641-107
ST. LOUIS (ex) ARMY AMMUNITION PLANT
AUGUST 2002

Sample Number	1641-101	1641-102	1641-103	1641-104	1641-105	1641-106	1641-107FB	Region 9	SCDM	
Sample Depth	0-6" below ground surface	4'-6' below ground surface	0-6" below concrete	0-6" below concrete	0-6" below concrete	0-1' below concrete	NA			
Sample Type/URS Sample Location	Soil / RDSB-10	Soil / RRSB-04	Soil / 02TS-03	Soil / 02TS-02	Soil / 02TS-09	Soil / 01SB-04	Field Blank	PRG (residential/industrial)	CR	RfD
Location or Building Number	Roadway	Railroad	2	2	2	1	N/A			
Location/Description	Roadway between the northwest corner of Building 5 and the northeast corner of Building 6	Railroad track on the north side of Building 3	In trench under the second from the north former rotary furnace on the west	In trench west of the second from the north former rotary furnace on the west	In trench near the second from the north former rotary furnace on the east	Beneath sump near the interior southwest corner of Building 1	NA			
PCDD/PCDF in Soil by GC/HRMS - ng/kg										
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1.00 U	0.980 U	0.952 U	1.29	2.72	0.943 U	NA	3.9/16	4	NV
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	5.00 U	4.90 U	4.76 U	8.30	5.53	4.72 U	NA	NV	8	NV
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	5.00 U	4.90 U	4.76 U	16.6 J	4.95 U	4.72 U	NA	NV	40	NV
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	5.00 U	4.90 U	10.8	821	70.5	4.72 U	NA	NV	100	NV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	5.00 U	4.90 U	4.85	106	25.4	4.72 U	NA	NV	100	NV
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	42.1	4.90 U	132	8,390	1,190	12.1	NA	NV	400	NV
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	9,050	167	19,300	30,200	23,200	2,630	NA	NV	NV	NV
2,3,7,8-Tetrachlorodibenzo-p-furan	1.00 U	0.980 U	0.952 U	26.7 J	2.07 J	0.943 U	NA	NV	40	NV
1,2,3,7,8-Pentachlorodibenzo-p-furan	5.00 U	4.90 U	4.76 U	10.1	4.95 U	4.72 U	NA	NV	80	NV
2,3,4,7,8-Pentachlorodibenzo-p-furan	5.00 U	4.90 U	4.76 U	33.3	4.95 U	4.72 U	NA	NV	8	NV
1,2,3,4,7,8-Hexachlorodibenzo-p-furan	5.00 U	4.90 U	4.76 U	209	4.95 U	4.72 U	NA	NV	40	NV
1,2,3,6,7,8-Hexachlorodibenzo-p-furan	5.00 U	4.90 U	4.76 U	152	4.95 U	4.72 U	NA	NV	40	NV
1,2,3,7,8,9-Hexachlorodibenzo-p-furan	5.00 U	4.90 U	4.76 U	8.03	4.95 U	4.72 U	NA	NV	40	NV
2,3,4,6,7,8-Hexachlorodibenzo-p-furan	5.00 U	4.90 U	4.76 U	235	4.95 U	4.72 U	NA	NV	40	NV
1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan	5.00 U	4.90 U	15.2 J	19100J	456	4.72 U	NA	NV	400	NV
1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan	5.00 U	4.90 U	4.76 U	406	12.4	4.72 U	NA	NV	NV	NV
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-furan	10.0 U	9.80 U	12.4	17,900 J	540	9.43 U	NA	NV	NV	NV
2,3,7,8-Dioxin Total Equivalents	1.33	0.017	4.96	468	37	0.384	NA	3.9 / 16	4	NV
Polychlorinated Biphenyls in Soil by GC/EC - ug/kg										
Aroclor 1248	41 U	40 U	40 U	3,600	1,000	43 U	NA	220 / 740	83	160
Aroclor 1254	41 U	40 U	40 U	1,900	440 J	43 U	NA	220 / 740	83	160
Aroclor 1260	41 U	40 U	40 U	440 U	41 U	43 U	NA	220 / 740	83	160
Semi-Volatile Organic Compounds in Soil - ug/kg (Elevated reporting limits in samples 1641-104 through 1641-106 because of interferences)										
Benzo(a)anthracene	760	400 U	400 U	13,000 U	4,100 U	8,600 U	NA	620 / 2,100	880	NV
Benzo(a)pyrene	740	400 U	400 U	13,000 U	4,100 U	8,600 U	NA	62 / 210	88	NV
Benzo(b)fluoranthene	720	400 U	400 U	13,000 U	4,100 U	8,600 U	NA	620 / 2,100	880	NV
Benzo(g,h,i)perylene	550	400 U	400 U	13,000 U	4,100 U	8,600 U	NA	NV	NV	NV
Benzo(k)fluoranthene	660	400 U	400 U	13,000 U	4,100 U	8,600 U	NA	6,200 / 21,000	8,800	NV
bis (2-ethylhexyl)phthalate	680 U	400 U	600 U	13,000 U	4,100 U	8,600 U	NA	35,000 / 120,000	46,000	1,600,000
Chrysene	870	400 U	400 U	13,000 U	4,100 U	8,600 U	NA	62,000 / 210,000	88,000	NV
Fluoranthene	1,400	400 U	400 U	13,000 U	4,100 U	8,600 U	NA	2,300,000 / 22,000,000	NV	3,100,000
Indeno(1,2,3-cd)pyrene	650	400 U	400 U	13,000 U	4,100 U	8,600 U	NA	620 / 2,100	880	NV
Isophorone	410 U	400 U	400 U	13,000 U	4,100 U	8,600 U	NA	510,000 / 1,800,000	670,000	16,000,000
2-Methylnaphthalene	410 U	400 U	400 U	13,000 U	4,100 U	8,600 U	NA	NV	NV	NV
N-Nitrosodiphenylamine	410 U	400 U	400 U	13,000 U	4,100 U	8,600 U	NA	99,000 / 350,000	130,000	NV
Pentachlorophenol	1,000 U	1,000 U	1,000 U	33,000 U	10,000 U	21,000 U	NA	3,000 / 9,000	5,300	2,300,000
Phenanthrene	410 U	400 U	400 U	13,000 U	4,100 U	8,600 U	NA	NV	NV	NV
Pyrene	1,300	400 U	400 U	13,000 U	4,100 U	8,600 U	NA	2,300,000 / 29,000,000	NV	2,300,000
Volatile Organic Compounds in Soil at Low Levels by GC/MS - ug/kg										
Acetone	11 U	10 U	14 U	29 U	67 J	10 U	11 U	1,600,000 / 6,000,000	NV	7,800,000
2-Butanone	10 U	10 U	10 U	10 U	19 J	10 U	11 U	7,300,000 / 27,000,000	NV	47,000,000
cis-1,2-dicholorethene	12	10 U	10 U	10 U	10 U	10 U	11 U	43,000 / 150,000	NV	780,000
Trichloroethene	27	10 U	10 U	10 U	10 U	10 U	11 U	53 / 110	58,000	NV

J: Estimated value.

NA: Not analyzed.

N/A: Not applicable.

NV: No value

U: Non-detect at the values listed.

Indicates reported concentration above at least one listed benchmark.

Table 2
SUMMARY OF DETECTED COMPOUNDS
SPLIT CONCRETE SAMPLES 1641-11 THROUGH 1641-16
ST. LOUIS (ex) ARMY AMMUNITION PLANT
AUGUST 2002

Sample Number	1641-11	1641-12	1641-13	1641-14	1641-15	1641-16	Region 9 PRG* (residential/industrial)	SCDM*	
Sample Depth	0-1"	0-1"	0-1"	0-1"	0-1"	0-1"			
Sample Type/URS Sample Location	Concrete / 02CS-01	Concrete / 02CS-04	Concrete / 02CS-06	Concrete / 02CS-08	Concrete / 02CS-10	Concrete / 02CS-02		CR	RfD
Building Number	2	2	2	2	2	2			
Location/Description	Between third and fourth columns from the north, on the far west side	Raised concrete between seventh and eighth columns from the north, on the far west side	Between the eighth and ninth columns from the north, on the east side interior	Between the eighth and ninth columns from the north, on the far east side	Near sump in the southeast corner of Building 2	Near the first column from the north, on the far east side			
PCDD/PCDF in Hazardous Waste by GC/HRMS - ng/kg									
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1,150	46.9	10.4	25.6	2.13	16.4	3.9/16	4	NV
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	2620	82.3	14 U	54 U	4.94 U	35	NV	8	NV
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	829	29.4	116	160	4.94 U	183	NV	40	NV
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	25,100	486	828	1,520	20.9	6,970	NV	100	NV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	9,910	165	319	384	7.34	1,570	NV	100	NV
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	66,700	4,740	1,970	5,920	124	13,000	NV	400	NV
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	122,000	9,560	2,560	14,800	652	12,000	NV	NV	NV
2,3,7,8-Tetrachlorodibenzo-p-furan	29.6	5.13	2.1 U	2.13	0.988 U	2.9	NV	40	NV
1,2,3,7,8-Pentachlorodibenzo-p-furan	49.7	27 U	4.89 U	110 U	4.94 U	20 U	NV	80	NV
2,3,4,7,8-Pentachlorodibenzo-p-furan	108	13.5	4.89 U	20 U	4.94 U	7.12	NV	8	NV
1,2,3,4,7,8-Hexachlorodibenzo-p-furan	188	19.7	4.89 U	15.3	4.94 U	20.3	NV	40	NV
1,2,3,6,7,8-Hexachlorodibenzo-p-furan	249	55 U	5.96	11.9	4.94 U	24	NV	40	NV
1,2,3,7,8,9-Hexachlorodibenzo-p-furan	53.7	10.8	4.89 U	5.2 U	4.94 U	6.72	NV	40	NV
2,3,4,6,7,8-Hexachlorodibenzo-p-furan	444	42.8	9.35	37.7	4.94 U	47.3	NV	40	NV
1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan	15,100	1,120	272	1,360	26.3	2,200	NV	400	NV
1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan	321	50 U	7.15	36.1	4.94 U	49.5	NV	NV	NV
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-furan	8,880	635	175	1,100	21.9	1,610	NV	NV	NV
2,3,7,8-Dioxin Total Equivalents	7,130	240	164	327	7.13	1,090	3.9 / 16	4	NV
Polychlorinated Biphenyls in Hazardous Waste by GC/EC - mg/kg									
Aroclor 1248	12 J	0.85 J	0.56 J	2.1 J	0.32 J	1.9 J	0.22 / 0.74	0.083	1.6
Aroclor 1254	0.043 U	0.0086 U	0.0043 U	0.0043 U	0.0043 U	0.0043 U	0.22 / 0.74	0.083	1.6
Aroclor 1260	0.055 U	0.011 U	0.0055 U	0.0055 U	0.41	0.0055 U	0.22 / 0.74	0.083	1.6
Semi-Volatile Organic Compounds in Hazardous Waste - mg/kg									
Benzo(a)anthracene	0.718	0.037 U	0.037 U	0.3	0.037 U	0.037 U	0.62 / 2.1	0.88	NV
Benzo(a)pyrene	0.651	0.44 U	0.44 U	0.56	0.044 U	0.044 U	0.062 / 0.21	0.088	NV
Benzo(b)fluoranthene	0.754	0.075 U	0.075 U	1.11	0.075 U	0.075 U	0.62 / 2.1	0.88	NV
Benzo(g,h,i)perylene	0.304	0.063 U	0.063 U	0.335	0.063 U	0.063 U	NV	NV	NV
Benzo(k)fluoranthene	0.307	0.06 U	0.06 U	0.58	0.06 U	0.06 U	6.2 / 21	8.8	NV
bis (2-ethylhexyl)phthalate	1.65	0.186 U	0.186 U	0.186 U	0.186 U	0.186 U	35 / 120	46	1,600
Chrysene	1.64	0.052 U	0.052 U	1.36	0.052 U	0.052 U	62 / 210	88	NV
Fluoranthene	1.04	0.498	0.153	1.95	0.046 U	0.046 U	2,300 / 22,000	NV	3,100
Indeno(1,2,3-cd)pyrene	0.066 U	0.066 U	0.066 U	0.066 U	0.066 U	0.066 U	0.62 / 2.1	0.88	NV
Isophorone	0.175 U	0.762	0.175 U	0.175 U	0.175 U	0.175 U	570 / 1,800	670	16,000
2-Methylnaphthalene	0.253	0.173 U	0.173 U	0.173 U	0.173 U	0.173 U	NV	NV	NV
N-Nitrosodiphenylamine	0.228	0.089 U	0.089 U	0.089 U	0.089 U	0.089 U	99 / 350	130	NV
Pentachlorophenol	0.64	NA I	NA I	NA I	NA I	NA I	3 / 9	5.3	2,300
Phenanthrene	0.949	0.656	0.071	0.556	0.035 U	0.102	NV	NV	NV
Pyrene	1.86	1.49	0.135	1.54	0.037 U	0.037 U	2,300 / 29,000	NV	2,300

I: Estimated value.

NA: Not analyzed.

I: Non-detect values invalidated by laboratory due to low acid surrogate recoveries.

N/A: Not applicable.

NV: No value

U: Non-detect at the values listed.

*Region 9 PRGs for residential and industrial soil, and SCDM Cancer Risk and Reference Dose soil pathway values are for comparison purposes only.

Indicates reported concentration above at least one listed benchmark.

Table 3
SUMMARY OF DETECTED COMPOUNDS
SPLIT OIL SAMPLE No. 1641-1
ST. LOUIS (ex) ARMY AMMUNITION PLANT
AUGUST 2002

Sample Number	**1641-1**
Sample Depth	NA
Sample Type/URS Sample Location	**Oil / 02PD-01**
Building Number	**2**
Location/Description	**Oil in pipe in the southeast corner**
PCDD/PCDF in Hazardous Waste by GC/HRMS - ng/kg	
2,3,7,8-Tetrachlorodibenzo-p-dioxin	9.8 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	49U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	49 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	49 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	49 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	418
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	4,670
2,3,7,8-Tetrachlorodibenzo-p-furan	9.8 U
1,2,3,7,8-Pentachlorodibenzo-p-furan	49 U
2,3,4,7,8-Pentachlorodibenzo-p-furan	49 U
1,2,3,4,7,8-Hexachlorodibenzo-p-furan	49 U
1,2,3,6,7,8-Hexachlorodibenzo-p-furan	49 U
1,2,3,7,8,9-Hexachlorodibenzo-p-furan	49 U
2,3,4,6,7,8-Hexachlorodibenzo-p-furan	49 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan	285
1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan	49 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-furan	552
2,3,7,8-Dioxin Total Equivalents	12.3
Polychlorinated Biphenyls in Hazardous Waste by GC/EC - mg/kg	
Aroclor 1248	7.8 J
Aroclor 1254	1.3 U
Aroclor 1260	1.7 U
Semi-Volatile Organic Compounds in Hazardous Waste - mg/kg	
Benzo(a)anthracene	11.1 U
Benzo(a)pyrene	13.2 U
Benzo(b)fluoranthene	22.5
Benzo(g,h,i)perylene	18.9 U
Benzo(k)fluoranthene	18 U
bis (2-ethylhexyl)phthalate	55.8
Chrysene	15.6 U
Fluoranthene	13.8 U
Indeno(1,2,3-cd)pyrene	19.8 U
Isophorone	52.5 U
2-Methylnaphthalene	51.9 U
N-Nitrosodiphenylamine	26.7
Pentachlorophenol	145 U
Phenanthrene	10.5 U
Pyrene	11.1 U
Volatile Organic Compounds in Solid Hazardous Matrices - mg/kg	
Acetone	3.4 U
2-Butanone	1.8 U
cis-1,2-dicholorethene	0.038 U
Trichloroethene	0.034 U

J: Estimated value.

U: Non-detect at the values listed.

ATTACHMENT 1

FIELD LOGBOOK NOTES
AUGUST 19-23 AND 26-27, 2002
ST. LOUIS (EX) ARMY AMMUNITION PLANT
ST. LOUIS, MISSOURI

19 August 2003

The TechLaw WAM Steve Bryant
OBJECTIVES: Check progress, conduct
overnight and split sampling
during site-specific environmental
baseline survey (EBS) and
Bldg 2 demolition oversight.
WEATHER: Overcast, mid 80s F
0700 Depart Lenexa en route to site
1030 Arrive at site. Sign in at
Site Trailer.
Meet Bob Black &
Melissa Felton with URS.
They stated that Geoprobe work
has begun on the west end of
the site, and trenching in
Bldg 2 also started.
1115 Proceed to Bldg 2. Observe
trenching by Arrowhead at
the northeast rotary-furnace
foundation. According to
Greg Wallace, Arrowhead, they
are clearing debris out of
areas that URS will be
sampling. All personnel are
wearing Level D plus
respirators for particulates.

19 August 2003

PHOTOGRAPHS

No.	TIME	DESCRIPTION
1	1127	Bldg 2 - trenched area
2	1130	" - rotary furnace loc.
3	1134	" - trenching
4	1147	Concrete coring RD-5
5	1610	Geoprobe RD-5

19 August 2002

1145 Meet Mike Ocsely, BGS, (URS sub for Geoprobe). Concrete coring is slow at RD-5

1155 Meet with Tom Lorenz, EPA. Begin walking tour with Bob Skach and Melissa Felton of URS.

1245 Leave site for lunch.

1345 Return to the site.

1400 Discuss proposed Modifications to SAP Px URS with Bob & Melissa. Tom Lorenz would like to defer any comments on the modification until discussed with Jim Harris, MDNR. Also discussed locations of of sediment and wastewater samples in Bldg 2 as listed in Table 3-1 and referred to in Figure 3-3 not shown. URS will Begin Geoprobing at site today.

1500 Proceed on site walk with Tom Lorenz.

1540 Review site slides found after EPA left

19 August 2002

by Arrowhead, showing historical site features and operations.

1610 URS/BGS probing at RD-5. URS collecting soil samples 0-6', 4-5', 19-20' bgs. Samples collected for PAHs, PCBs, Total Metals, Mercury, and VOCs by URS

1635 Leave site for the day. No split samples collected. Transite (asbestos containing material (ACM) removal continuing on the east end of Bldg 3. Aquadrill (URS drilling subcontractor) arrive on site.

Work Plan

20 AUGUST 2002

The TechLaw WAM Steve Bryant
OBJECTIVE: Oversight of Phase II Site-specific EBS and Bldg 3 demolition activities
WEATHER: Overcast, 70's F

0755 Arrive on-site.
Discuss planned activities with Lou Lorenz, EPA WAM.
Proceed on site walkthrough.
URS/BCS soil sampling at RD-07E. They are moving to RD-08 & RD-08E.

945 Aquadrill setting up at new well location 3MW-1

1010 URS preparing to collect sediment and wastewater samples at RD-11 / SRS DRW-1

1130 Decision by EPA and TechLaw to collect soil split sample from RD-10, 0-6" interval.
BCS begins pushing.
Soil sample will be collected by URS. Off-set hole to be used for volume.
Silty clay fill, brown.
Left RD-07

20 AUGUST 2002

No.	TIME	DESCRIPTION
1	1100	Cable tool rig @ 3MW-1
2	1137	DPT @ RD-10
3	1210	RD-10 core
4	1615	Bldg 3 breaking concrete

20 AUGUST 2002

1214 URS collecting soil samples for splits. #BH-101
for Low-level VOCs - 4-40ml VOA
SVOCs -> 1-8oz jar
PCBs
PCDD/PCDFs - 1-8oz jar
corresponds to URS sample
RA-RISB-10(0.0-0.5)-0802

1230 Labeled field blank
#1641-107FB, Low-level VOCs
4-40ml VOAs

1315 Advancing location RD-10E.

1350 BGS will move to soil probe locations in Bldg 1 after concrete coring completed.

1400 URS decides to move to RA SB4.
SMW-1 has been advanced to 17' bgs. Shale encountered and is a dry hole.
URS decides to move to next well SMW-3

1600 URS/BGS completes soil sampling RA1SB1 through RA1SB4
After RA1SB4

20 AUGUST 2002

1605 No more soil sampling to be conducted by URS today. Concrete breaker moved into Bldg 2

1640 Leave site for the day.

21 August 2002

The TechLaw WAM (Steve Bryant)
OBJECTIVE: Conduct overnight and split sampling during Site-specific EBS
WEATHER: Sunny, 80's to 90's F
0730 Arrive on-Site. Get an update on site activities from Matt Phoenix and Melissa Felton from URS. Geoprobing continuing at RR-01. Concrete breaking to continue in Bldg 2.
830 Well 3MW-1 will be abandoned due to lack of water. Approximately 2-3 inches have accumulated, not enough to sample
900 Discuss status of well drilling. 3MW-3 has water in a gravel layer near the surface (2-3 bgs) but is dry below to ~21' bgs. URS requests concurrence of EPA on grouting hole and using Geoprobe to check for water in soil core at next well location (3MW-2). Tom Lorenz, EPA WAM, has

21 August 2002
PHOTOGRAPHS

No.	Time	Description
1	940	Hydrocarbon-stained soil, 3MW-2
2	950	Checking utility locations
3	1000	DPT at 2MW-1
4	1455	Hand augering in Bldg 2. Split sample-loc. 1641-103
5	1559	Split sample loc. 1641-104
6	1654	Split sample loc. 1641-105
7	1655	Split sample loc. 1641-105
8	1655	Split sample loc 1641-105
9	1710	Area of samples 1641-103, -104

21 AUGUST 2002

telephone conversation with Bob Stach of URS. Decisions Made to have a conference call with Jim Harris, MDNR regarding well drilling. In the meantime URS will have BGS conduct DPT in next well location.

0830 During advancement of soil probe lower part of R-17' interval has black stained soil with slight hydrocarbon odor (SMW-7) URS subcontractor (Cascio Industrial Services, Inc) continuing sediment and wastewater sampling from manholes.

1000 BGS setting up at SMW-1 location to check water in soil core.

0940 Dry hole. Participate in teleconference with Brad Eaton, Project Manager, Alasd Lawson, Geologist, both of USACE, and Bob Stach of URS. Decision is left to regulators as far as how to proceed. Tom Lorenz, EPA, states that his opinion is to not try to

21 AUGUST 2002

advance well borings, but if that Jim Harris, MDNR, must concur.

1140 URS/BGS setting up at RA-RRSB-04 split sample will be collected here 4-6' bgs.

1205 URS collecting split sample 1641-102 for Low-level VOCs PCBs, Pest, SVOCs corresponds to URS sample # RA-RRSB-04 (4-6)-0802

1230 Depart site for lunch.

1300 Return to site. URS/BGS continuing Geoprobe soil sampling along railroad north of Bldg 3. Concrete breaking continuing in Bldg 2.

1505 URS collecting split samples in Bldg 2. Extra volume collected here EPA #1641-103 corresponds to URS# 02TS-03 (0-0.5)-0802 This sample was collected under former rotary furnance location on the west side, next to last foundation from the north.

21 August 2002

1535 URS collecting split sample #1641-104. Corresponds to URS sample # 0215-09(0-0.5)-802. This sample was collected from a trench between the 4th and 5th steel columns on the west (front) side. Both samples consisted of 2-40ml VOAs with sodium bisulfate, 2-40ml VOAs unpreserved, 1-8oz glass for SVOCs/PCBs, 1-8oz glass for PCDD/DFs, Extra volume for MS/MSD collected from #1641-103.

1635 URS collecting split sample #1641-105 Corresponds to URS sample # 0215-09(0-0.5)-806 collected from trench between 5th & 6th column on east side.

1715 Pack samples for shipment to EPA lab.

1830 Sample cooler (1) dropped at Fedex for shipment to EPA Region 7 Lab.

21 August 2002

All split samples collected from Bldg 2 were by hand auger methods. VOC aliquots were filled first, followed by SVOC, PCB and PCDD/DF aliquots.

22 August 2002

The TechLaw WAM Steve Bryant

OBJECTIVE: Continue oversight and split sampling during the site-specific EBS by URS and oversight of Bldg 3 demolition activities by Arrowhead

WEATHER: Sunny, 80's to 90's F

0750 Arrive on-site. Discuss planned activities with Melissa Perkins, URS. Melissa stated that Geoprobe will continue in the roadways, then proceed to Bldg 1. Laser survey of sewer lines will also begin today at the west end of the site. Asbestos (transite) removal continuing on the east end of Bldg 3 by Arrowhead's sub (Pirtag)

800 Odeen Industrial Services (URS sub) preparing video camera near sewer manhole at the southwest corner of Bldg 3

Geoprobing at RD 4, by URS/BES

930 URS/BES working at RD 4E

1000 Odeen having problems with camera

22 August 2002

PHOTOGRAPHS

No	TIME	DESCRIPTION
1	800	Preparing sewer video
2	1234	Liquid in conduit Bldg 2
3	1234	Liquid in conduit Bldg 2
4	1240	Liquid in conduit Bldg 2
5	1435	Sump in SW corner Bldg 1
6	1435	Close up for 1641-106
7	1435	Close up for 1641-106
8	1801	Well installation SMW-2

28 AUGUST 2002

Lights for video camera survey of sewer system.

1045 Jim Harris, MDNR, arrives on-site. Proceed on-site walk with Tom Lorenz and Jim Harris.

1230 While walking through Bldg 2, area of black, oily material near and in electrical conduit where area excavated for sampling yesterday.

1300 BGB setting up at 01SB-04 in Bldg 1

1335 URS collecting split sample #1641-106, split of URS sample # 01SB04(0-1)-0802. Sample collected beneath sump in southwest corner of Bldg 1. Column of soil has moderate to strong petroleum hydrocarbon odor to ~ 6 feet below the sump.

1430 Brian Shay, USACE, Ft. Leonard Wood arrives on-site

1500 Discuss split sampling of [illegible]

29 AUGUST 2002

Concrete in Bldg 2 during activities on Monday Aug. 26.

1550 URS/Aquadrill advancing cable tool rig at SMW-2 currently at ~15' bgs. Hydrocarbon odor noted in soil.

1800 URS/Aquadrill preparing to install well at SMW-2. 10' screen set at approx. 21' bgs. 2" diameter PVC screen and casing. Also noted in Bldg 2 that approximately 9-10 55-gallon drums had been filled with water from the east-west pipe trench. Water had apparently entered into the excavation trench after exposing the soil beneath the concrete.

1825 SMW-2 installed, except for grout and well vault.

1835 Leave site for the day. Sample #1641-106 to be delivered to ETA lab by Steve Bryant on 8/23/02.

22 AUGUST 2002

ADDITIONAL NOTES: Asbestos removal and demolition contractor incorrectly noted as Arrowhead Contracting. Spirtas Wrecking Co. is actually conducting transite removal and demolition at Bldg. During a site walk at approximately 1700 hours, it was observed by Mr. Harris, Mr. Lorenz, and Mr. Bryant that transite panels were being dropped from a height of approximately 20 feet to the ground, resulting in broken panels. This incorrect removal procedure was brought to the attention of Ben Williams of Arrowhead who informed Spirtas to conduct the removal by gently lowering the panels instead of dropping. No further transite removal was conducted this day after this incident.

[signature]

22 AUGUST 2002

SPLIT SAMPLE No.	DATE	TIME	URS Sample No.	Location	Containers	Analyses
1641-101	8/20/02	1314	RA-RDSB-10(6-6.5)-0802	RA-RDSB-10	4-40ml VOAs, 2-8oz glass	LL VOCs/SVOCs/PCBs/PCDD/DF
1641-102	8/21/02	1205	RA-RRSB-04(4)-0802	RA-RRSB-04	4-40ml VOAs, 2-8oz glass	LL VOCs/SVOCs/PCBs/PCDD/DF
1641-103	8/21/02	1905	02TS-03(0-0.5)-0802	02TS-03	4-40ml VOAs, 2-8oz glass	LL VOCs/SVOCs/PCBs/PCDD/DF
1641-104	8/21/02	1535	02TS-02(0-0.5)	02TS-02	4-40ml VOAs, 2-8oz glass	LL VOCs/SVOCs/PCBs/PCDD/DF
1641-105	8/21/02	1632	02TS-09(0-0.5)	02TS-09	4-40ml VOAs, 2-8oz glass	LL VOCs/SVOCs/PCBs/PCDD/DF
1641-107 FB	8/20/02	1730	NA	NA	4-40ml VOAs	LL VOCs
1641-106	8/22/02	1335	015B-04(0-1)-0802	015B-04	4-40ml VOAs, 2-8oz glass	LL VOCs/SVOCs/PCBs/PCDD/DF
1641-1	8/21/02	855	02PD-01-0802	02PD-01	2-40ml VOAs, 2-8oz glass	LL VOCs/SVOCs/PCBs/PCDD/DF
1641-11	8/26/02	1130	02CS-01-0802	02CS-01	2-8oz glass	SVOCs/PCBs/PCDD/DF
1641-12	8/26/02	1330	02CS-04-0802	02CS-04	2-8oz glass	SVOCs/PCBs/PCDD/DF
1641-13	8/26/02	1430	02CS-06-0802	02CS-06	2-8oz glass	SVOCs/PCBs/PCDD/DF
1641-14	8/26/02	1530	02CS-05-0802	02CS-05	2-8oz glass	SVOCs/PCBs/PCDD/DF
1641-15	8/26/02	1630	02CS-10-0802	02CS-10	2-8oz glass	SVOCs/PCBs/PCDD/DF
1641-16	8/26/02	1655	02CS-07-0802	02CS-07	2-8oz glass	SVOCs/PCBs/PCDD/DF

26 August 2002

The TechLaw WAM Steve Bryant

OBJECTIVE: Conduct split sampling of concrete samples in Bldg 2 and conduct oversight during the site specific EBS and demolition of Bldg 3 activities.

WEATHER: Sunny, low to mid 80's F

830 Arrive on-site. URS continuing subsurface soil sampling. Parks Wrecking Co. continuing demolition activies at the west end of Bldg 3. According to Melissa Feltenof URS, sewer soil samples were collected at depths below 10' bgs in roadway sample locations south of Bldg 3 rather than installing new borings.

915 URS/AMEC finishing soil sampling at SKSB-04.

1000 Sparks continuing transite removal east end of Bldg 3. Observed dropping transite panels from approximately 20' above ground surface.

START

26 August 2002

PHOTOGRAPHS

No.	TIME	DESCRIPTION
1	910	Bldg 3 demo-west end
2	1007	Dropping transite panel
3	1100	Concrete drilling #164-11
4	1315	Concrete drilling #164-12
5	1405	Concrete drilling #164-13
6	1520	Concrete drilling #164-14
7	1620	Concrete drilling #164-15
8	1630	Concrete drilling #164-16

START

26 AUGUST 2002

1020 URS/ODESCO conducting video survey heading southwest in ~6" diameter line from Manhole 17. Ridicam advancing camera due to sand, other obstructions in line. Odesco to attempt to flush the line.

1040 Proceed to Bldg 2 to collect split concrete samples. URS/Arrowhead will remove surface dust from approximate one-foot square area at each location to be sampled. Hammer drill will be used to get concrete at depth of ~1 inch below surface.

1100 Start location 02CS-01. Sample will be collected by pouring dust from numerous holes into stainless steel bowl, composting, and then placing into containers.

1130 Split sample (1641-11) collected. URS# 02CS 01-08-02

1140 Tom Lorenz, EPA, arrives on site

1200 Leave site for lunch.

26 AUGUST 2002 — 2

1300 Return to site. URS/Arrowhead using hammer drill at 02CS-04.

1330 Collect split sample 1641-12 URS# 02CS-04-0802

1400 URS/Arrowhead hammer drilling at 02CS-06. Split sample to be collected.

1430 Collect 1641-13 URS# 02CS-06-0802

1530 Collect 1641-14 URS# 02CS-08-0802 This location is between the 8th & 9th columns from the north on the east side of the building.

1620 Collect 1641-15 URS# 02CS-10-0802 This location is near the sump in the southeast corner of Bldg 7.

1650 Collect 1641-16. URS# 02CS-02-0802. Location is near the northeast corner inside Bldg 2.

1715 Depart site for the day.

27 AUGUST 2002

The TechLaw WAM Steve Bryant

OBJECTIVE: Collect split sample of oil/water mixture in sump at southeast corner of Bldg 2 and oversight of Bldg 3 demolition activities.

WEATHER: Sunny, 80°F

745 Arrive on-site. Prepare cooler and sample containers. URS continuing Geoprobe activities with B&S. Split tasks continuing demo.

810 Tom Lorentz, EPA WAM, arrives on-site. Discuss site activities.

840 Proceed to Bldg 2 to collect split sample of oily substance in sump at the southeast corner of Bldg 2. The oily liquid is in an approximate 6-8 inch diameter pipe open at the surface.

855 Collect split sample 1641-1. Split with URS 0ZP-01-0502. Liquid is purple-black oily material with no water.

1000 Depart site en route to EPA Region 2 Lab to deliver split samples.

27 AUGUST 2002

PHOTOGRAPHS

No.	TIME	DESCRIPTION
1	850	Location of 1641-1
2	852	Location of 1641-1
3	852	Close up of pipe
4	855	Collecting 1641-1
5	859	Sample 1641-1

ADDITIONAL NOTE: Wells SMW-1, SMW-1, SMW-2, and SMW-3 have been installed but are dry. Sewer video camera survey and sediment/wastewater sampling completed by URS sub Odesco Industrial Services.

ATTACHMENT 2

SITE PHOTOGRAPHS
AUGUST 19-23 AND 26-27, 2002
ST. LOUIS (EX) ARMY AMMUNITION PLANT
ST. LOUIS, MISSOURI

August 19, 2002

PHOTO 1

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/19/02
Location: Building 2 **Direction:** East **Time:** 11:27 AM
Photographer: Steve Bryant
Description: Trenched area by rotary furnace.

PHOTO 2

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/19/02
Location: Building 2 **Direction:** Northwest **Time:** 11:30 AM
Photographer: Steve Bryant
Description: Excavated rotary furnace foundation near the northwest corner of the building.

August 19, 2002

PHOTO 1

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/19/02
Location: Building 2 **Direction:** East **Time:** 11:27 AM
Photographer: Steve Bryant
Description: Trenched area by rotary furnace.

PHOTO 2

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/19/02
Location: Building 2 **Direction:** Northwest **Time:** 11:30 AM
Photographer: Steve Bryant
Description: Excavated rotary furnace foundation near the northwest corner of the building.

PHOTO 3

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/19/02
Location: Building 2 **Direction:** Northwest **Time:** 11:34 AM
Photographer: Steve Bryant
Description: Removing debris around rotary furnace foundation.

PHOTO 4

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/19/02
Location: Northwest corner of Building 3 **Direction:** South **Time:** 11:47 AM
Photographer: Steve Bryant
Description: Concrete coring at URS sample location RA-RDSB-05.

PHOTO 5

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/19/02
Location: Northwest corner of Building 3 **Direction:** South **Time:** 4:10 PM
Photographer: Steve Bryant
Description: Geoprobe soil sampling at URS sample location RA-RDSB-05.

August 20, 2002

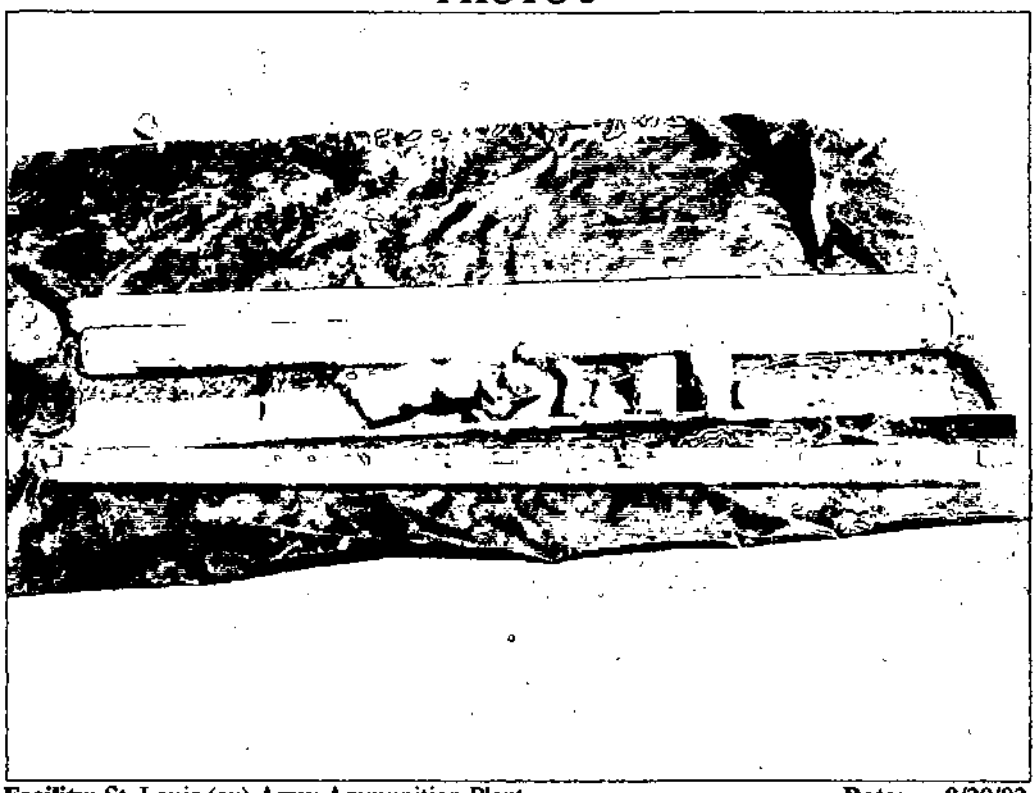
PHOTO 1

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/20/02
Location: Parking lot east of Building 2 **Direction:** Southwest **Time:** 11:00 AM
Photographer: Steve Bryant
Description: Cable tool drilling at 3MW-1.

PHOTO 2

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/20/02
Location: Roadway south of Building 3 **Direction:** Northeast **Time:** 11:37 AM
Photographer: Steve Bryant
Description: Geoprobe soil sampling at URS sample location RA-RDSB-10 (EPA split Sample No. 1641-01 collected from 0-6 inches bgs).

PHOTO 3



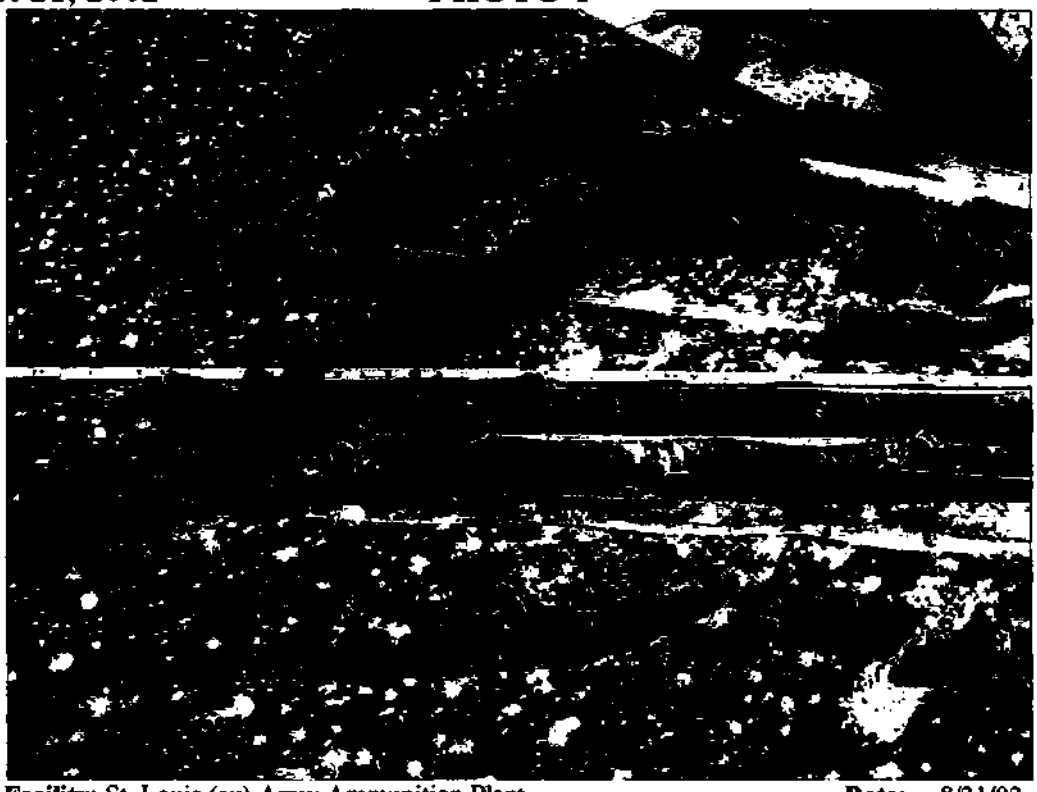
Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/20/02
Location: Roadway south of Building 3 **Direction:** NA **Time:** 12:20 PM
Photographer: Steve Bryant
Description: Soil core, 0 to 10 feet bgs, URS sample location RA-RDSB-10.

PHOTO 4

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/20/02
Location: Building 2 **Direction:** West **Time:** 4:15 PM
Photographer: Steve Bryant
Description: Breaking concrete at rotary furnace foundation.

August 21, 2002

PHOTO 1



Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/21/02
Location: North of former fuel oil storage area **Direction:** NA **Time:** 9:40 AM
Photographer: Steve Bryant
Description: Soil core near 8MW-2 showing hydrocarbon staining at approximately 10–12 feet bgs.

PHOTO 2

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/21/02
Location: North of Building 2 **Direction:** Northwest **Time:** 9:50 AM
Photographer: Steve Bryant
Description: Checking utility locations north of Building 2.

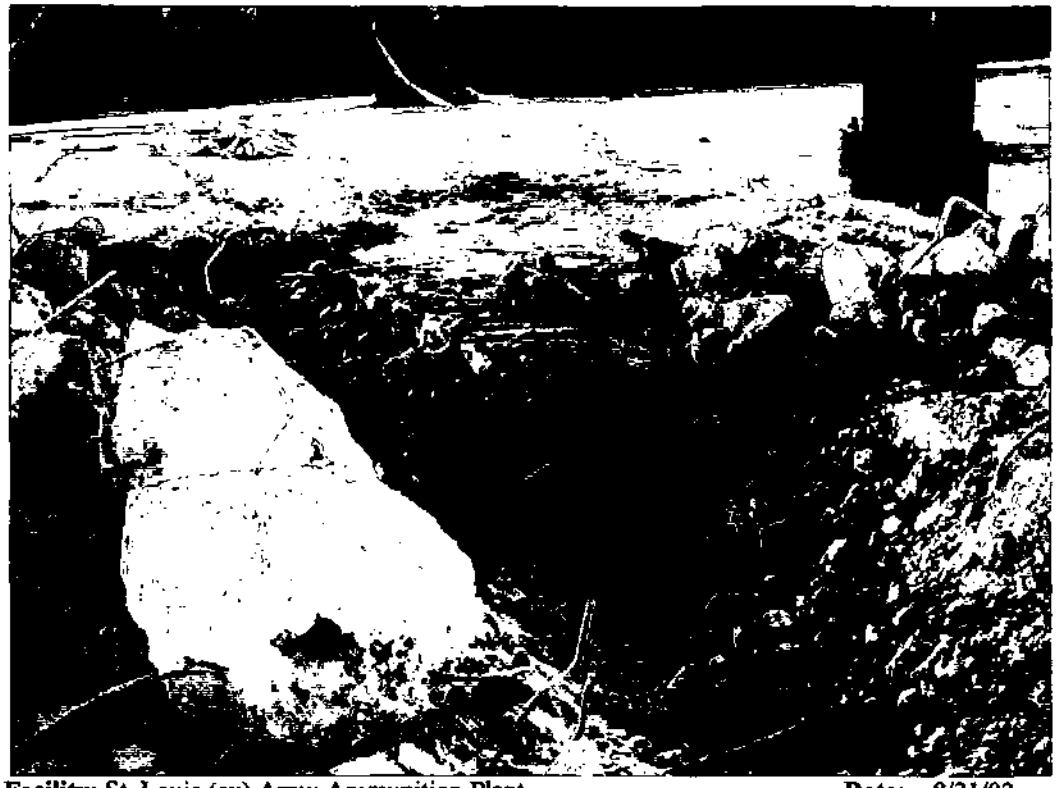
PHOTO 3

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/21/02
Location: North of Building 2 **Direction:** South **Time:** 10:00 AM
Photographer: Steve Bryant
Description: Geoprobe soil coring near well location 8MW-1.

PHOTO 4

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/21/02
Location: Building 2 **Direction:** NA **Time:** 2:55 PM
Photographer: Steve Bryant
Description: URS collecting sample 02TS-03 (0-6 inches) – 0802 (EPA split Sample No. 1641-103).

PHOTO 5



Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/21/02
Location: Building 2 **Direction:** West **Time:** 3:55 PM
Photographer: Steve Bryant
Description: Location of URS sample 02TS-02 (0-6 inches)-0802 (EPA split Sample No.1641-104).

PHOTO 6

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/21/02
Location: Building 2 **Direction:** NA **Time:** 4:54 PM
Photographer: Steve Bryant
Description: Location of URS sample 02TS-09 (0-6 inches)–0802 (EPA split Sample No. 1641-105).

PHOTO 7

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/21/02
Location: Building 2 **Direction:** Southeast **Time:** 4:55 PM
Photographer: Steve Bryant
Description: Location of URS sample 02TS-09 (0-6 inches)– 0802 (EPA split Sample No. 1641-105).

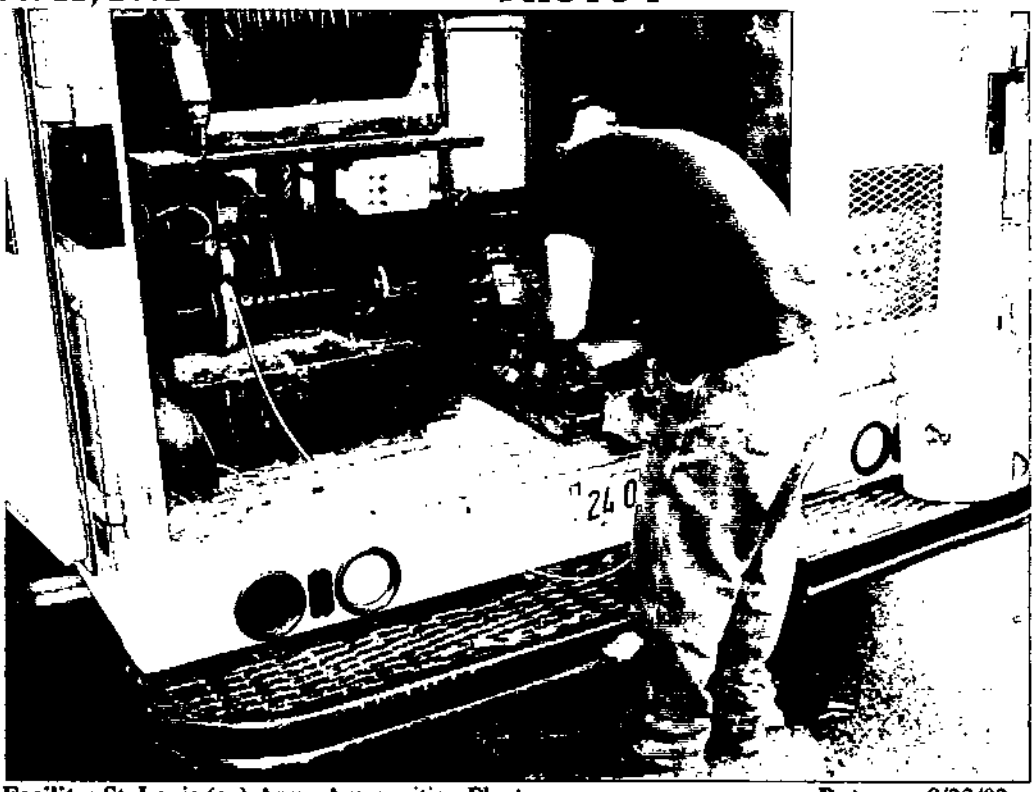
PHOTO 8

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/21/02
Location: Building 2 **Direction:** East **Time:** 4:55 PM
Photographer: Steve Bryant
Description: Location of URS sample 02TS-09 (0-6 inches) – 0802 (EPA split Sample No. 1641-105).

PHOTO 9

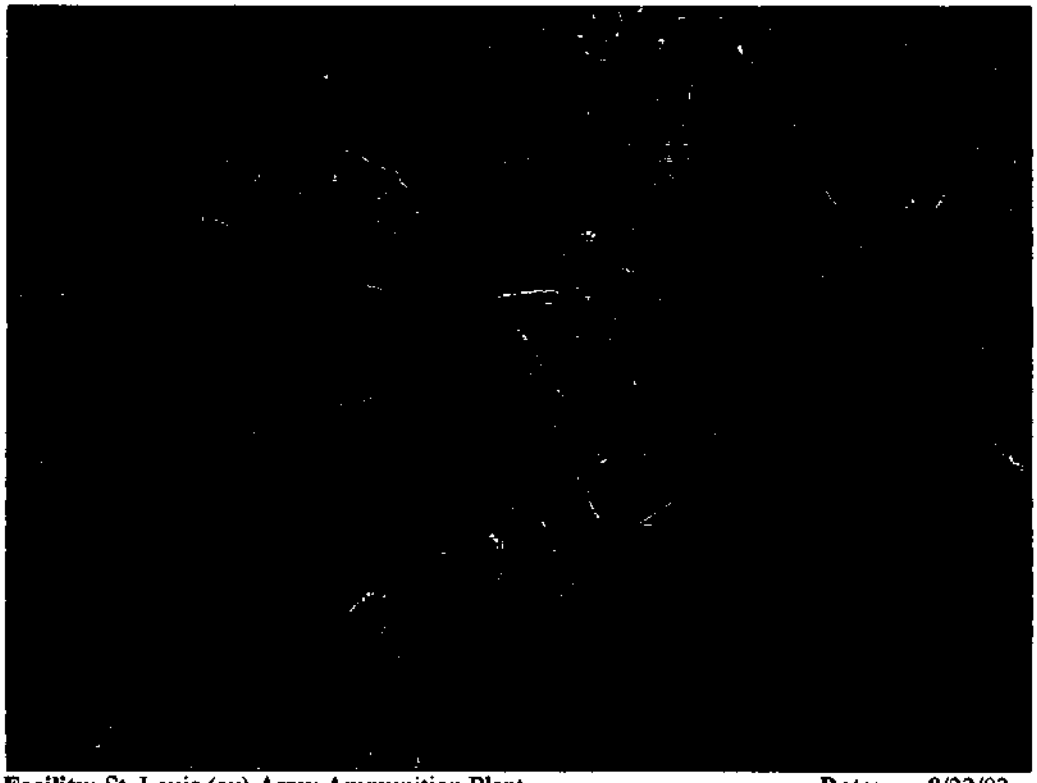
Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/21/02
Location: Building 2 **Direction:** West **Time:** 5:10 PM
Photographer: Steve Bryant
Description: General area of EPA split Sample Nos. 1641-103 and 1641-104.

August 22, 2002 **PHOTO 1**



Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/22/02
Location: Southwest corner of Building 3 **Direction:** West **Time:** 8:00 AM
Photographer: Steve Bryant
Description: Odesco Industrial Services preparing sewer video camera.

PHOTO 2



Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/22/02
Location: Building 2 **Direction:** NA **Time:** 12:34 PM
Photographer: Steve Bryant
Description: Black oily liquid observed in conduit.

PHOTO 3

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/22/02
Location: Building 2 **Direction:** NA **Time:** 12:34 PM
Photographer: Steve Bryant
Description: Black oily liquid observed in conduit.

PHOTO 4

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/22/02
Location: Building 2 **Direction:** NA **Time:** 12:40 PM
Photographer: Steve Bryant
Description: Black oily liquid observed in conduit.

PHOTO 5

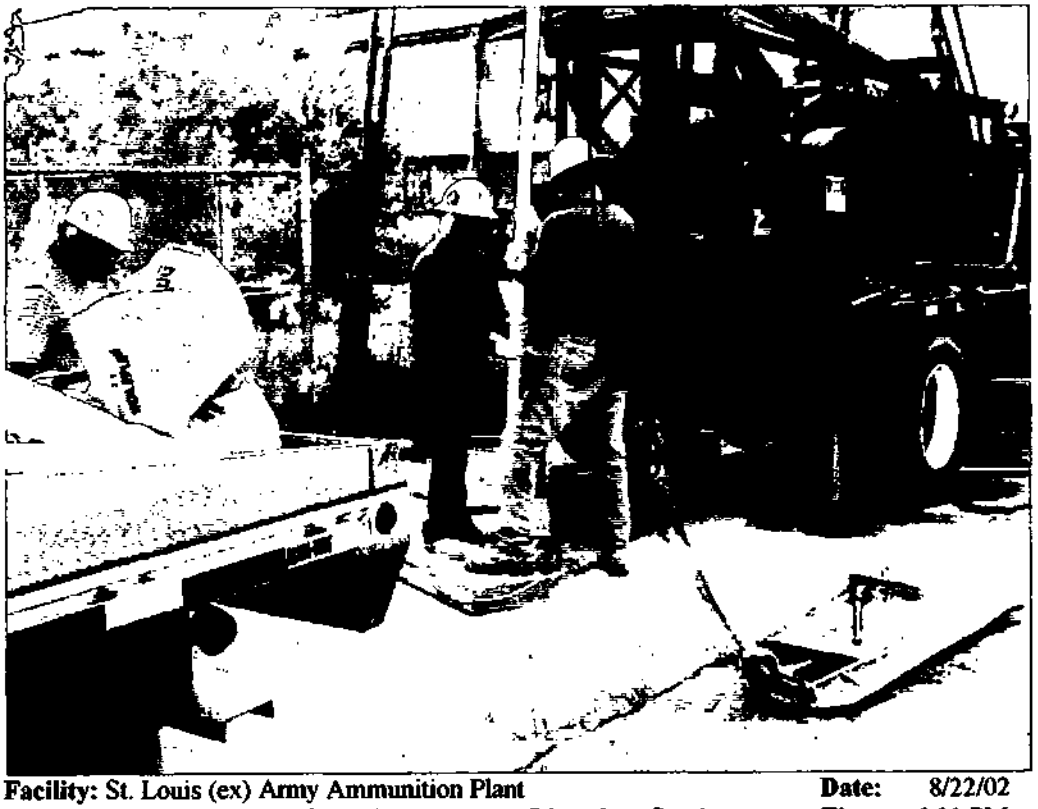
Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/22/02
Location: Building 1 **Direction:** West **Time:** 2:35 PM
Photographer: Steve Bryant
Description: BGS preparing to setup for soil sampling at URS location 01SB-04.

PHOTO 6 – Too dark-no flash-DELETED

PHOTO 7

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/22/02
Location: Building 1 **Direction:** Down **Time:** 2:35 PM
Photographer: Steve Bryant
Description: URS sampling location 01SB-04 in bottom of sump at southwest corner of building (EPA split Sample No.1641-106).

PHOTO 8

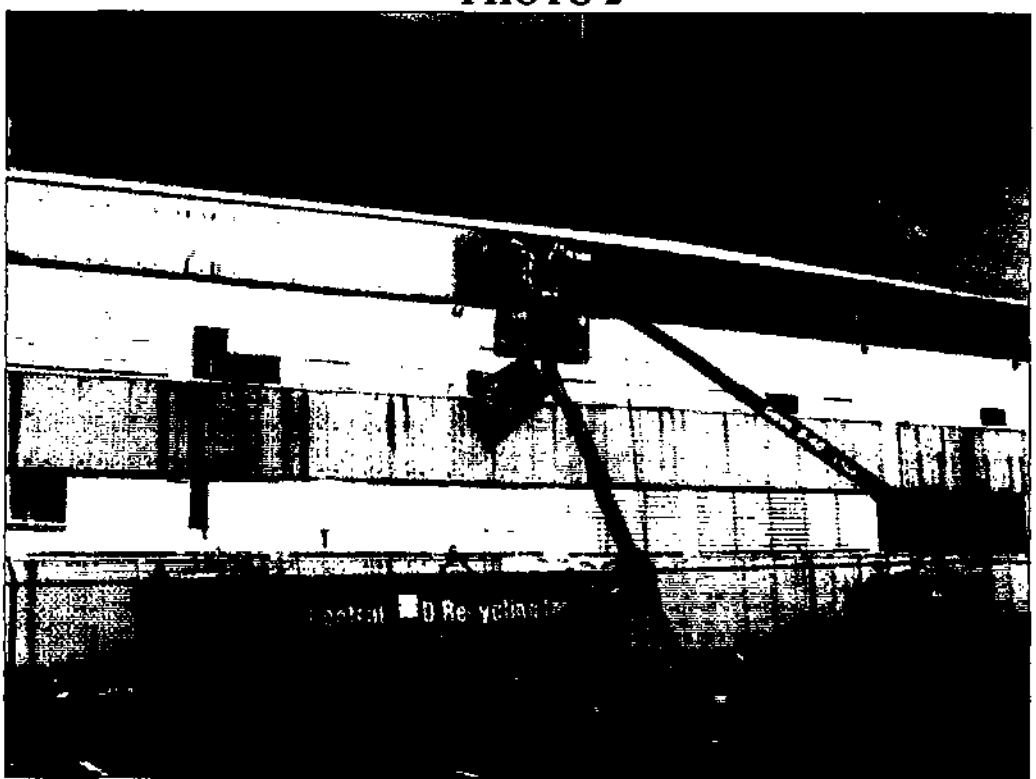


Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/22/02
Location: North of former fuel oil storage area **Direction:** South **Time:** 6:01 PM
Photographer: Steve Bryant
Description: Aquadrill installing well 8MW-2.

August 26, 2002 **PHOTO 1**

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/26/02
Location: Building 3 **Direction:** South **Time:** 9:10 AM
Photographer: Steve Bryant
Description: Demolition debris at west end of building.

PHOTO 2



Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/26/02
Location: East end of Building 3 **Direction:** NA **Time:** 10:07 AM
Photographer: Steve Bryant
Description: Contractor dropping a transite panel.

PHOTO 3

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/26/02
Location: Building 2 **Direction:** Northeast **Time:** 11:00 AM
Photographer: Steve Bryant
Description: Concrete drilling to collect URS sample 02CS-01-0802 (EPA split Sample No. 1641-11).

PHOTO 4

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/26/02
Location: Building 2 **Direction:** West **Time:** 1:15 PM
Photographer: Steve Bryant
Description: Concrete drilling to collect URS sample 02CS-04-0802 (EPA split Sample No. 1641-12).

PHOTO 5

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/26/02
Location: Building 2 **Direction:** North **Time:** 2:05 PM
Photographer: Steve Bryant
Description: Concrete drilling to collect URS sample 02CS-06-0802 (EPA split Sample No. 1641-13).

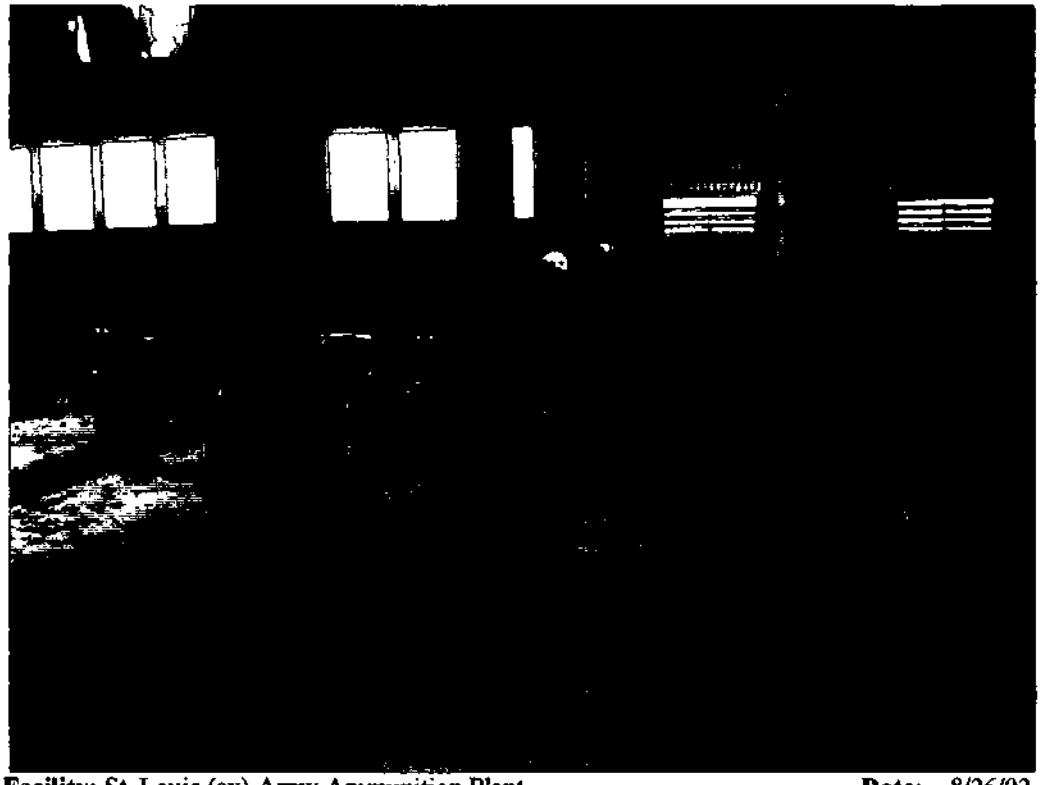
PHOTO 6

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/26/02
Location: Building 2 **Direction:** Northeast **Time:** 3:20 PM
Photographer: Steve Bryant
Description: Concrete drilling to collect URS sample 02CS-08-0802 (EPA split Sample No. 1641-14).

PHOTO 7

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/26/02
Location: Building 2 **Direction:** South **Time:** 4:20 PM
Photographer: Steve Bryant
Description: Location of URS concrete sample 02CS-10-0802 near wall in background (EPA split Sample No. 1641-15).

PHOTO 8

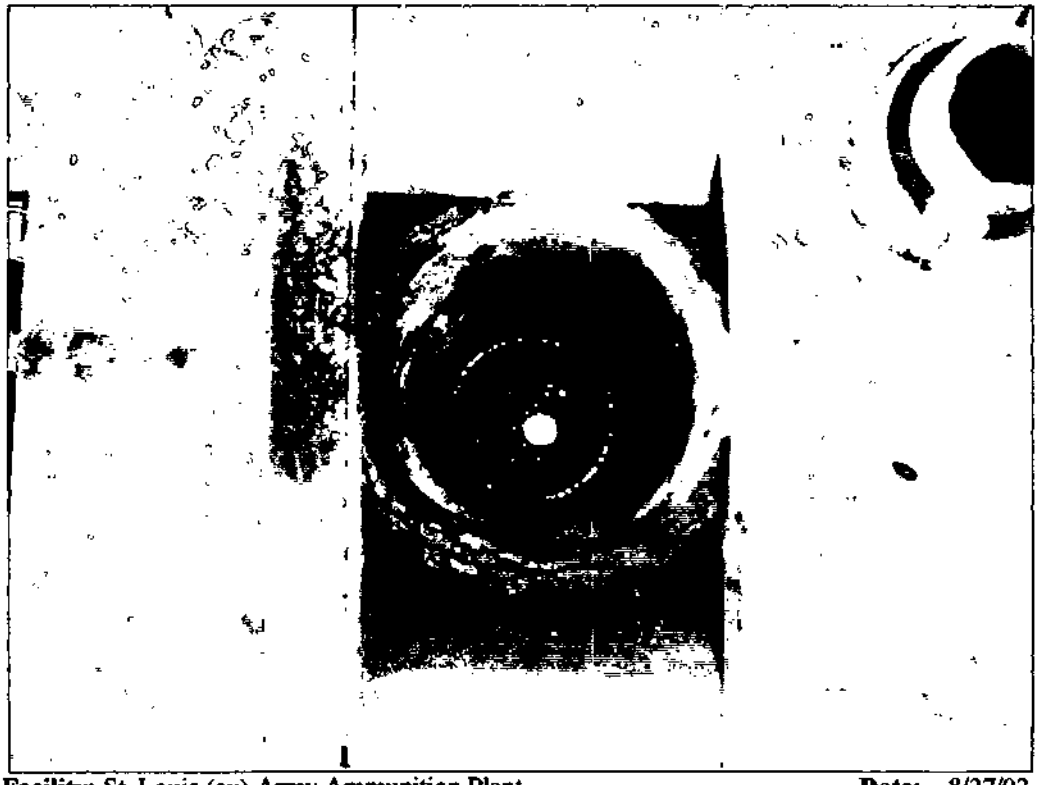


Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/26/02
Location: Building 2 **Direction:** North **Time:** 4:30 PM
Photographer: Steve Bryant
Description: Concrete drilling to collect URS sample 02CS-02-0802 (EPA split Sample No. 1641-16).

August 27, 2002 **PHOTO 1**

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/27/02
Location: Building 2 **Direction:** Northwest **Time:** 8:50 AM
Photographer: Steve Bryant
Description: Location of URS concrete sample (02CS-10-0802-multiple holes) and location of URS oil sample from pipe near wall (sample 02PD-01-0802; EPA split Sample No. 1641-1).

PHOTO 2

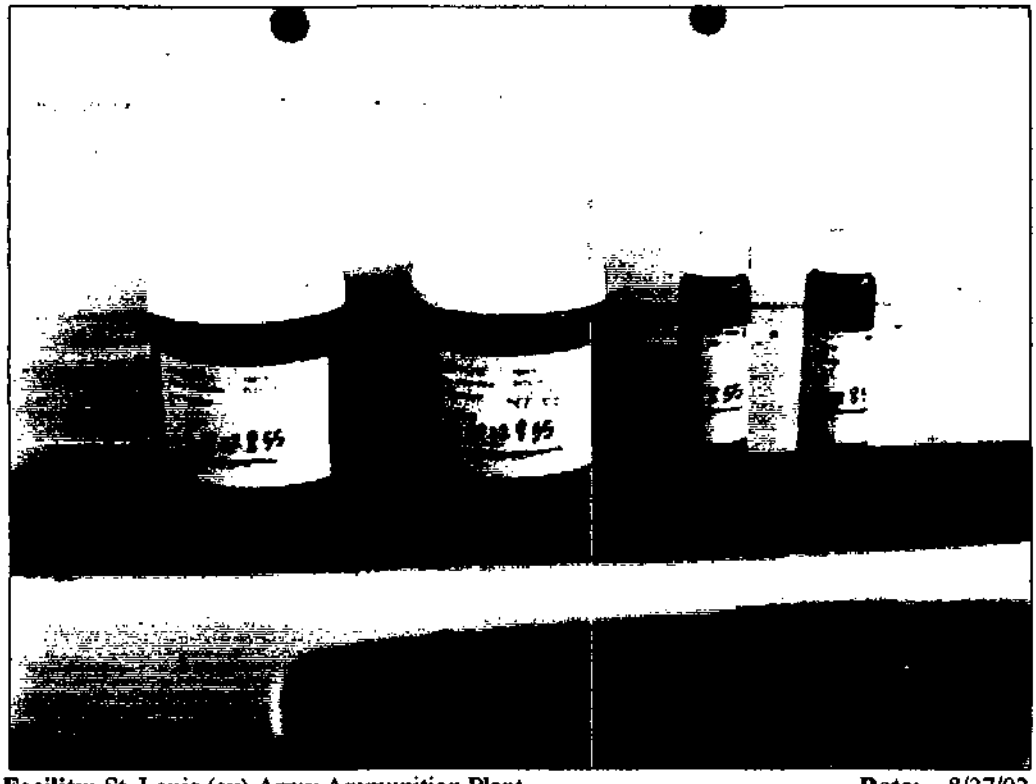


Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/27/02
Location: Building 2 **Direction:** NA **Time:** 8:52 AM
Photographer: Steve Bryant
Description: Oily liquid in pipe; URS sample 02PD-01-0802 (EPA split Sample No. 1641-1).

PHOTO 3

Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/27/02
Location: Building 2 **Direction:** South **Time:** 8:55 AM
Photographer: Steve Bryant
Description: Collecting URS sample 02PD-01-0802 (EPA split Sample No. 1641-1).

PHOTO 4



Facility: St. Louis (ex) Army Ammunition Plant **Date:** 8/27/02
Location: Building 2 **Direction:** NA **Time:** 8:59 AM
Photographer: Steve Bryant
Description: Close-up of containers for EPA split Sample No. 1641-1.

ATTACHMENT 3

URS WORK PLAN MODIFICATIONS
SITE-SPECIFIC ENVIRONMENTAL BASELINE SURVEY
ST. LOUIS (EX) ARMY AMMUNITION PLANT
ST. LOUIS, MISSOURI

Modifications to Work Plan dated August 16, 2002

1. FSP. Table 3-1, Page 1, Building 1, Sampling Methods and Rationale, 3rd paragraph. In Building 1, there are four sample locations planned to be collected from directly beneath the sumps in this building. All of the former sumps appear to have been filled in with concrete. It is possible that they were filled in with some substance other than concrete (such as sand or debris), and just covered over with concrete at the surface. An attempt will be made to core through the concrete in these sumps in order to collect the planned samples from directly below the sump. However, if it is determined that these sumps are filled in with either concrete or other materials that would make drilling very difficult, (such as construction debris); we propose to relocate the Geoprobe boring immediately adjacent to the former sump and collect the samples from this adjacent location.
2. FSP. Table 3-1, Page 1, Building 1, Sampling Methods and Rationale, 3rd paragraph. The work plan proposed two site characterization soil borings (01SB-08 and 01SB-09) at the two sumps located on the west side of Building 1. However, during sample location activities there was only one sump identified instead of two as the work plan suggested. As a result, we propose to eliminate one of the soil boring locations for one of these sumps (01SB-09), since the second sump was not identified. Sampling at the remaining boring would be done in accordance with Item No. 1, above.
3. FSP. Section 5.8, Page 5-14, First bullet. We propose not to use explosion-proof cameras during the sewer survey, since no indication of "explosive" environments were observed during the site reconnaissance. During the sewer survey, a flow of clean water will be used during all television camera inspection work and also continuous ventilation will be maintained during all inspection work. This precaution should be sufficient to insure that a possible explosive environment does not exist or develop during the inspection.
4. FSP. Section 5.2, Page 5-2, First Paragraph. To expand on this paragraph regarding offsets, if sufficient sample volume for all analyses (including QA/QC analyses) is not obtained from the original Geoprobe boring, we propose to either offset slightly from this location and collect additional sample volume from the offset boring, or expand the sample interval from 1 ft to 2 or 3 ft in order to get enough sample volume. Soils from both borings will be composited together to get a uniform sample, for all analyses except for VOCs, BTEX and TPH-GRO.
5. FSP. Section 3.2, Page 3-5, 2nd paragraph. If a risk assessment boring (which is laid out on a randomly placed grid) ends up being located within five feet of a site characterization boring, we propose to move the risk assessment boring to coincide with the site characterization boring, and to use the samples from this boring for both risk assessment and site characterization purposes.
6. FSP. Table 3-1, Page 1, Site-Wide Sampling Rationale, 4th paragraph; and Section 3.2, Page 3-5, 2nd paragraph. We propose to co-locate roadway sample locations and sewer line sample locations where possible, to reduce the number of times that concrete coring will need to be done in the roadways surrounding the site. Roadway samples are planned to be collected from 0-6 inches, 4-5 feet and 9-10 feet and sewer line samples are planned to be collected from beneath the sewer line (depths will be determined by looking at adjacent manholes). If sample depths for roadway and

sewer line samples should coincide, one sample will be collected instead of two, as long as all analyses are. Both roadway samples and sewer line samples are planned to be collected every 150 feet in the work plan. All of these locations will be kept at least five feet away from what is expected to be the center of the sewer line.

7. FSP. Table 3-1, Page 2, Building 2, additional information. While URS was on site for sample location activities, old slides were found by Arrowhead Contracting during demolition activities. These slides showed pictures of oily hydraulic equipment in Building 2. Oil staining was also observed in many areas of Building 2 during sample location activities. As a result of these findings, we propose to collect 8 to 12 concrete samples (using a hammer drill) to be analyzed for PCBs from Building 2, due to the potential for PCBs in hydraulic oil.
8. FSP. Table 3-1, Page 2, Building 2, additional information. URS also observed a possible sump and an oil-filled pipe located next to it, in the southeasternmost portion of Building 2. We propose to sample the oil in this pipe for TPH-GRO, TPH-DRO and PCBs. The previous Comprehensive EBS did not indicate that this oil had been sampled.
9. FSP. Table 3-1, Page 3, Building 4, additional information. During sample location activities, a thin oily residue (like oily dust) was observed in the utility trenches to the north of the air compressor pits. The origin of this oily residue is not known, however a wipe sample collected during the previous EBS from an oil spot in this building (exact location unknown), indicated the presence of PCBs. We propose to collect two wipe samples and two concrete samples (with a hammer drill) from these utility trenches for PCB analysis.
10. Table 1 of QAPP and Table 3-2 of the FSP. Due to the high quantity of samples to be collected during this investigation and due to the fact that sample volume is limited from both the Geoprobe sample locations and from the monitoring wells, we propose that all QA/QC samples (duplicates, MS/MSDs and QA split samples) be collected at a rate of 5%. (MS/MSDs were originally planned to be collected at a rate of 5%. Duplicates and QA split samples were originally planned to be collected at a rate of 10%.) MS/MSD samples may be collected at a higher rate (of up to one per every eight samples), if it is determined that the laboratory is not including an MS/MSD sample in each sample delivery group. URS believes that 5% QA/QC samples are adequate to accurately assess the quality of the laboratory data.
11. Table 1 of the QAPP. As per the QAPP (Table 1), rinsate samples are supposed to be collected for all types of samples. We propose not to collect any rinsate samples for soils, sediments, concrete or surface wipes during this investigation, since comparing this data to the rinsate samples is difficult because the units between the rinsate and the actual samples are different. As a result, it would be more of a qualitative analysis as opposed to a quantitative analysis.

Modifications to Work Plan - August 26, 2002

1. FSP, Section 5.5, Page 5-11. This section states that concrete samples will be collected by coring the concrete from the appropriate depths, and sending the concrete cores to the laboratory for pulverizing. Since the laboratory does not have a good way to pulverize these samples, they have requested that we do this in the field. As a result, we will use a hammer drill to collect the concrete core samples because this drill pulverizes the concrete as we are drilling. These pulverized samples will then be sent to the laboratory for analysis. **Response: All agreed.**

2. FSP, Section 5.5, Page 5-11. This section states that concrete core samples in Buildings 1, 4 and 7 will be collected from depths of 0-1 inch and 2-3 inches at each of the locations (one location per building). The eight concrete samples added to Building 2 on 8-15-02 will be collected from 0-1 inch only. **Response: All agreed.**

3. FSP, Table 3-1 and 3-3. This is a clarification, not a change. Dioxin samples will also be collected from each of the test pit sample locations. Table 3-1 states that dioxin samples will be collected from the test pits and they will be held, pending the PCB results. Table 3-3 did not include the dioxin analysis for these samples. This omission in Table 3-3 was a typo. **Response: All agreed.**

4. FSP, Table 3-1 and 3-3. This is a clarification, not a change. A typo in Table 3-1 for Buildings 5 and 6, states that the soils contaminated with SVOCs will be analyzed for SVOCs and TPH. Table 3-3 states that they will be analyzed for PAHs and TPH. The intent is to analyze the samples from these locations for PAHs (not the full SVOC list) and TPH. **Response: All agreed.**

5. FSP, Page5-14, Section 5.7, First bullet. This is a clarification, not a change. The FSP says that one blank wipe sample will be collected for each sample area. A "sample area" will be defined as a building. Therefore, one blank wipe sample will be collected from each building that contains wipe sample locations. **Response: All agreed.**

6. FSP, Page 5.5, Section 5.3.1, third bullet. At the request of Jim Harris of MDNR, monitoring wells will have a 10 ft screened interval instead of a five foot screened interval as specified. Also, in accordance with Mr. Harris's request, the bottom of each well be placed just above the shale. He also requested that all wells be completed, even though no water-bearing unit is encountered. Wells will not be developed if they are dry since no formation water will be available. **Response: All agreed.**

7. FSP, Page 5.5, Section 5.3.1, seventh and eighth bullet. The FSP specifies that bentonite grout be placed above the bentonite chip seal. As per Evan Kifer of the State of MO – Department of Wellhead Protection, it is acceptable to use bentonite chips in place of the bentonite grout that was specified to be placed above the bentonite chip seal. **Response: All agreed.**

8. In Building 2, soil borings 02TX-01 (located under quench oil tank concrete utility trench), and RA-02SB-03 and RA-02SB-12 (located within concrete utility trenches of unknown purpose) are all located within deep concrete trenches (approximately 8 feet deep). There is very thick concrete in the bottom of all three of these concrete utility trenches (the breaker machine is not able to get through it after pounding on it for several hours). We propose to offset these borings to the side of each of these concrete utility trenches (moving the borings as much as12 feet). Samples for boring 02TX-01, would be collected from 0-6 inches and 4-5 feet below the bottom of the quench oil tank trench. Samples from borings RA-02SB-12 and RA-02SB-03 would be collected from 0-6 inches, 4-5 feet and 9-10 feet below the top of the soil at these locations. Based on visual and PID readings at this location, it may be necessary to collect a deeper sample at this boring location, because during excavation in the trench at this location, an odor was noticed. **Response: All agreed that we could offset these three borings so that they are located just outside of the trench (as close as is safely possible). Sampling for the two risk assessment borings will start just below the gravel layer under the concrete, and continue downward to a depth of 10 feet below the top of soil (as specified in the work plan). Sampling for the offset trench location (02TX-01) will begin below the bottom of the trench. Of special note is the fact that URS is not collecting any samples of the gravel that is below the concrete at any of our sample locations throughout this investigation. A sample of the gravel will be collected however, if the gravel appears to be contaminated.**

9. During MDNR and USEPA's site visit on 8-22-02, they identified two additional sample locations in Building 2. They recommended collecting a wipe sample from, the cables found in one of the trenches in Building 2, which contained a black oily substance. The second location is in the westernmost penthouse of this building. There are some containers connected to more of the oily-substance filled cable that was found in the above-mentioned trench. They would like us to open up one of these containers and collect a product sample if possible, or a wipe sample. They believe that these containers might contain this oily substance found in the cable. Both samples would be analyzed for PCBs only. **Response: All agreed. It was also agreed that a sample will be collected for dioxin analysis from the sample location in the westernmost penthouse. This sample will be held for analysis, pending PCB results.**

10. During MDNR and USEPA's site visit on 8-22-02, they recommended breaking out the concrete that covers the pits that the breaking machines formerly sat in. They wanted us to excavate out these locations, to see if any contaminated material was present in these pits. This has since been done and no contaminated material was encountered (both pits were filled with gravel). A hole was punched in the bottom of both of these pits so samples could be collected from under these concrete pits. **Response: All agreed.**

11. FSP, Figure 3-9. Sample location 10SB-01 was moved approximately six feet east to avoid a concrete pad that was encountered at 15ft bgs in the original location. This

location was offset because the Geoprobe rig could not punch through the concrete. Excavation in this area to get below the concrete pad was not a viable option due to the close proximity of Building 3 to this location. The excavation could not be sloped back properly without possibly impacting the stability of the building. **Response: All agreed.**

12. For Discussion. In monitoring well 08MW-02 (which is within the boundaries of the former fuel storage area), an area of visually impacted soil was encountered from a depth of about 9-14 feet bgs. No sample was collected from the boring because soil sampling was not included in the FSP for the monitoring well borings and the depth is at, or slightly deeper than, the depth of the risk assessment samples (9-10 ft. bgs.) **Response: It was decided that if this impacted material is encountered in the borings surrounding this location, then it would be sampled. If this impacted material is not encountered in the surrounding boring locations, then another Geoprobe boring will be done next to 08MW-02, in order to collect a sample of this impacted material.**

Additional Note: Mr. Jim Harriss of MDNR brought up the possibility of collecting risk assessment samples from deeper than 10 feet below the top of the soil.
Response: This sampling was not included in the FSP and it was not planned for in the budget. So, without further direction, URS will implement the FSP as it is written.

Conference Call Participants:

Heather Black (AMCOM)
Sandy Olinger (AMCOM)
Brad Eaton (USACE)
Tom Lorenz (USEPA)
Jim Harris (MDNR)
Bob Skach (URS)
Melissa Felton (URS)

Proposed Modifications to Work Plan dated September 5, 2002

1. Only two (03MW-01 and 08MW-03) of the four monitoring wells that were recently installed on site contained any water. It is likely that this water has come into the formation from a nearby leaking hydrant. These two wells have been purged dry twice, and they are not quick to recover. We propose to sample both these wells without any further development or purging. We also propose to analyze these wells **FOR SOME INDICATOR PARAMETER THAT WOULD TELL US IF THIS IS WATER FROM THE HYDRANT OR IF IT IS ACTUALLY WATER FROM THE FORMATION.** We would also like to propose that the analyses to be sampled for from these wells, be collected in the following order: VOCs, PCBs, **INDICATOR PARAMETER,** PAHs, Metals + Hg, SVOCs, Explosives, Pesticides, Nitrate, and Phosphorus. Finally, we would like to propose that any analyses that cannot be collected within a 24 hour period starting at the beginning of sampling, not be collected from these wells. Monitoring wells 08MW-01 and 08MW-02 will not be developed or sampled since they do not contain any water from the formation.

2. For the existing wells (those not installed during this field effort), all wells will be purged in accordance with the work plan, unless the well is purged dry even when the pump is on its lowest setting. If the well is purged dry, then the well will be considered fully purged, and sampling will commence upon recovery of the well. We propose that the analyses to be sampled for from these wells, be collected in the following order: VOCs, PCBs, PAHs, Metals + Hg, SVOCs, Explosives, Pesticides, Nitrate, and Phosphorus. Finally, we would like to propose that any analyses that cannot be collected within a 24 hour period starting at the end of purging, not be collected from these wells. If any of these wells are dry (prior to initiating the purging process), then they will not be sampled.

3. We propose to collect coordinates for sample locations that are located inside Buildings 4, 5 and 6, by measuring off existing building features such as building corners, instead of surveying these with conventional survey equipment.

4. QAPP, Table 2 The reporting limits for lead, chromium VI, and arsenic will be changed as follows:
   Lead: Water RL = 1.0 ug/L (Was originally 0.0036ug/L)
   Chromium VI: Soil RL = 2.0 mg/Kg Water RL = 1 ug/L (Was originally 0.2mg/Kg and 0.16ug/L)
   Arsenic: Water RL = 0.2 ug/L (Was originally 0.045ug/L)

5. We propose to backfill the trenches and test pits with the same materials that we took out of them, if all of the results are clean.

Proposed Modifications to Work Plan - September 9, 2002

1. We propose not to collect samples from borings RA-04SB-08, RA-04SB-09 and RA-04SB-10. The reason for not collecting these samples is because when these locations were hand augered inside the building, sand was encountered in each of the three holes. In one of the three holes, we were able to auger down to a depth of approximately 6 feet below the top of the concrete, when refusal was encountered. This refusal, which was also encountered at similar depths in the risk assessment borings on the north side of this building, appears to be a concrete foundation for the bottom of this building that has been filled with sand. This building was built on a sloped surface, likely resulting in the need for this filled material and concrete. As a result, since this is likely fill material for this building and not truly indicative of what will remain at the site when the building is gone, we propose not to collect these samples. Samples were still collected from the northernmost risk assessment borings though, since there appeared to be some impacted material at these locations. These samples would not likely be used for the risk assessment either. **It was agreed that this sampling would be dictated by the Risk Assessors, and if a representative sample of soil could not be obtained, the sand would be sampled and analyzed as Characterization samples. Jim Harris asked that the 3 samples be collected immediately south of the building if soil samples could not be obtained from within the building. Subsequent conversations with Jim Garrison confirmed this decision, and requested that Risk Assessment samples RA-04SB-01 and RA-04SB-06 west of Building 4 should be moved to a location inside the building. The original samples will be used for characterization and not risk assessment.**

2. This is to clarify that borings RA-RRSB-12 and RA-RRSB-13 are not risk assessment borings as indicated in Table 3-3 (page 10 of 12), but are background railroad borings, and they will be sampled as discussed in the meeting on September 5th, 2002. These two borings will be renamed BKSB-11 and BKSB-12. **Agreed.**

3. After the meeting on September 5th, it was discussed that the CENWK chemist, Dick Medary, requested that the EPA Level IV validation be deleted from the project due to the additional QC measures taken by other aspects of the project. This would delete the 2nd to the last paragraph on page 1-8 and the 4th paragraph on page 1-9, in Section 1.6 of the QAPP. **Agreed, and Brad Eaton will discuss this item with Tom Lorenz to see if he concurs with this decision.**

ATTACHMENT 4

ANALYTICAL RESULTS

United States Environmental Protection Agency

Region 7 Laboratory
25 Funston Road
Kansas City, KS 66115

Date: 10/2/2002

Subject: Transmittal of Sample Analysis Results for ASR #: 1641
Activity Number: TFL7YX
Activity Description: St. Louis (EX) AA Plant sampling

From: Michael Thomas, Associate Laboratory Director
Regional Laboratory, Environmental Services Division

To: Tom Lorenz
SUPR/FFSE

This is the sample analysis results transmittal for the above-referenced Analytical Services Request (ASR). The data contained in this transmittal have been approved by the Regional Laboratory. This transmittal contains all of the sample analysis results for this ASR. The Regional Laboratory should be notified within 14 days if any changes are needed to the contents of this report. If you have any questions, comments or data changes, please contact the Laboratory Customer Service Department at 913-551-5295.

cc: Analytical Data File

ASR Number: 1641

Summary of Activity Information
10/2/2002

Activity Leader: Lorenz, Tom **Org:** SUPR/FFSE **Phone:** (913) 551-7292
Activity Number: TFL7YX
Activity Desc: St. Louis (EX) AA Plant sampling
Location: St. Louis **State:** Missouri **Type:** Superfund/Oil
Superfund Name: ST LOUIS (EX) ARMY AMMUNITION PLANT - Site Evaluation/Disposition **Site ID:** 07YX **Site OU:** 00
Purpose: Site characterization

Explanation of Codes, Units and Qualifiers used on this report.

Sample QC Codes: QC Codes identify the type of sample for quality control

__ = Field Sample
FB = Field Blank

Units: Specific units in which results are reported.

mg/kg = Milligrams per Kilogram
ng/kg = Nanograms per Kilogram
ug/kg = Micrograms per Kilogram

Data Qualifiers: Specific codes used in conjunction with data values to provide additional information on the quality of reported results, or used to explain the absence of a specific value.

(Blank) = Values have been reviewed and found acceptable for use.
I = Invalid sample/data - Value not reported.
J = The associated numerical value is an estimated quantity.
U = Not detected at or above the reportable level shown.

Activity Number: TFL7YX ASR Number: 1641 Sample Information Summary

Activity Desc: St. Louis (EX) AA Plant sampling 10/2/2002

Sample Numbe	QC Code	Matrix	Location	External Sample No.	Start Date	Start Time	End Date	End Time	Receipt Date
1	- __	Hazardous	Split of URS #02PD-01-0802		08/27/2002	8:55			08/27/2002
11	- __	Hazardous	Split of URS #02CS-01-0802		08/26/2002	11:30			08/27/2002
12	- __	Hazardous	Split of URS #02CS-04-0802		08/26/2002	13:30			08/27/2002
13	- __	Hazardous	Split of URS #02CS-06-0802		08/26/2002	14:30			08/27/2002
14	- __	Hazardous	Split of URS #02CS-08-0802		08/26/2002	15:30			08/27/2002
15	- __	Hazardous	Split of URS #02CS-10-0802		08/26/2002	16:20			08/27/2002
16	- __	Hazardous	Split of URS #02CS-02-0802		08/26/2002	16:55			08/27/2002
101	- __	Soil	Geoprobe location RDSB-10 (0-0.5)		08/20/2002	12:14			08/22/2002
102	- __	Soil	Geoprobe location RRSB-04 (4-6)		08/21/2002	12:05			08/22/2002
103	- __	Soil	Split of URS sample #02TS-03 (0-0.5)		08/21/2002	15:05			08/22/2002
104	- __	Soil	Split of URS #02TS-02 (0-0.5)		08/21/2002	15:35			08/22/2002
105	- __	Soil	Split sample of URS #02TS-09 (0-0.5)		08/21/2002	16:32			08/22/2002
106	- __	Soil	Split sample of URS #01SB-04 (0-1)-0802		08/22/2002	13:35			08/23/2002
107	- FB	Soil	5035 Soil VOA Trip Blank sample		08/20/2002	12:30			08/22/2002

Analysis	Comments About Results For This Analysis

PCBs in Hazardous by GC/EC

All samples had at least one of the two surrogates with a recovery outside the applicable upper control limit. The elevated recoveries were believed to be due to matrix effects and the nature of the samples. All aroclors, except Aroclor 1248, were non-detect in all samples. Aroclor 1248 was found to be present in all of the samples, and the reported values have been qualified (i.e. "J-coded") as estimated based on the high surrogate recoveries.

PCBs in Soil by GC/EC

The reporting limits are elevated in sample -104 (10X) due to dilutions.

Aroclor 1254 in sample —105 was J-coded based on high surrogate recoveries (94%).

PCDD/PCDF in Soil by GC/HRMS

The Toxicity Equivalency Factors used to calculate the 2,3,7,8-Dioxin Total Equivalents (TEQ) were obtained from the World Health Organization (WHO) 1997. The TEQ value is the sum of only positive concentrations multiplied by the individual toxic equivalent factor. U-coded values were not used in the calculation of the TEQ.

All Tetrachlorodibenzo-p-furan values are J-coded. These results have not been confirmed by a secondary column due to time constraints. These J-coded values were used when calculating the TEQ, thus resulting in worst case values, which may be biased high.

Results for 1234678-Heptachlorodibenzo-p-furan and Octachlorodibenzo-p-furan in sample 104 have been J-coded due to possible diphenyl ethers present in the sample. The results for these compounds could be biased high.

The ion ratio for 123478-Hexachlorodibenzo-p-dioxin was not within the required limits in sample 104. An estimated maximum possible concentration (EMPC) was calculated according to SW-846 Method 8290. The value was J-coded, indicating that it is estimated.

Because the TEQ was calculated from estimated values due to interferences, co-elution, and unconfirmed TCDF values, they are themselves estimated and are worst case values which may be biased high.

Analysis of spiked samples indicated high recoveries for 1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan. This problem may have been caused by matrix intereferences in the sample. The reported result in sample 103 for this compound has been J-coded, indicating that the results could be biased high by approximately 25%.

Semi-Volatile Organic Compounds in Hazardous Waste

At least two of the three acid surrogates in samples 1641-12 thru 1641-16 had recoveries below the lower control limits. The base neutral surrogates had acceptable recoveries. The one low acid surrogate recovery in sample 1641-11 did not warrant invalidation of the non-detects. However, due to the very low acid surrogate recoveries in samples 1641-12 thru 1641-16, the acid compounds which were reported as non-detect in these samples were invalidated (i.e., "I-coded").

Semi-Volatile Organic Compounds in Soil

The reporting limits are elevated in samples -104 (30X), -105 (10X), and -106 (20X) because of interferences.

Slight bis(2-ethylhexyl)phthalate contamination was found in the laboratory method blank. Only samples containing this compound at a level greater than ten times the contamination level of the blank are reported without being qualified. All samples that contained this compound but at a level less than ten times the contamination in the blank have the result "U-coded" indicating the method reporting limit has been raised to the level found in the sample. Samples affected were: -101 and -103.

VOC's in Soil at Low Levels by GC/MS Closed-System Purge-and-Trap

Acetone was J-coded in sample -105. Although the analyte in question has been positively identified in the sample, the quantitation is an estimate (J-coded) due to the initial instrument calibration curve not meeting linearity specifications.

Acetone and 2-butanone were J-coded in sample -105. Although the analytes in question has been positively identified in the sample, the quantitations are estimates (J-coded) due to the daily instrument calibration not meeting accuracy specifications. The actual concentration for these analytes may be as much as 32% and 29% higher, respectively, than the reported values.

Results for 1,2-dibromo-3-chloropropane in samples —101, -102, -103, -104, -105, -106, -107FB were invalidated due to unacceptably low initial and continuing relative response factors..

Slight acetone contamination was found in the laboratory method blank. Only samples containing this compound at a level greater than ten times the contamination level of the blank are reported without being qualified. All samples that contained this compound but at a level less than ten times the contamination in the blank have the result "U-coded" indicating the method reporting limit has been raised to the level found in the sample. Samples affected were: -101, -103, -104, and -105.

VOCs in Solid Hazardous Matrices by GC/MS

Due to the nature of the sample, an aliquot of the oil was weighed out and then analyzed. Therefore, results are reported in units of mg/Kg (ppm).

Analysis / Analyte	Units	1-__	11-__	12-__	13-__
PCBs in Hazardous by GC/EC					
Aroclor 1016	mg/kg	2.2 U	0.074 U	0.015 U	0.0074 U
Aroclor 1221	mg/kg	4.1 U	0.14 U	0.027 U	0.014 U
Aroclor 1232	mg/kg	2.5 U	0.083 U	0.017 U	0.0083 U
Aroclor 1242	mg/kg	2.8 U	0.093 U	0.019 U	0.0093 U
Aroclor 1248	mg/kg	7.8 J	12 J	0.85 J	0.56 J
Aroclor 1254	mg/kg	1.3 U	0.043 U	0.0086 U	0.0043 U
Aroclor 1260	mg/kg	1.7 U	0.055 U	0.011 U	0.0055 U
PCDD/PCDF in Hazardous by GC/HRMS					
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	9.8 U	1150	46.9	10.4
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	ng/kg	49 U	2620	82.3	14 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	49 U	829	29.4	116
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	49 U	25100	486	828
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	49 U	9910	165	319
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	418	66700	4740	1970
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxi	ng/kg	4670	122000	9560	2560
2,3,7,8-Tetrachlorodibenzo-p-furan	ng/kg	9.8 U	29.6	5.13	2.1 U
1,2,3,7,8-Pentachlorodibenzo-p-furan	ng/kg	49 U	49.7 U	27 U	4.89 U
2,3,4,7,8-Pentachlorodibenzo-p-furan	ng/kg	49 U	108	13.5	4.89 U
1,2,3,4,7,8-Hexachlorodibenzo-p-furan	ng/kg	49 U	188	19.7	4.89 U
1,2,3,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	49 U	249	55 U	5.96
1,2,3,7,8,9-Hexachlorodibenzo-p-furan	ng/kg	49 U	53.7	10.8	4.89 U
2,3,4,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	49 U	444	42.8	9.35
1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan	ng/kg	285	13100	1120	272
1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan	ng/kg	49 U	321	50 U	7.15
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-furan	ng/kg	552	8880	635	175
2,3,7,8-Dioxin Total Equivalents	ng/kg	12.3	7130	240	164
Semi-Volatile Organic Compounds in Hazardous Waste					
Acenaphthene	mg/kg	15.3 U	0.051 U	0.051 U	0.051 U
Acenaphthylene	mg/kg	9.3 U	0.031 U	0.031 U	0.031 U
Anthracene	mg/kg	11.4 U	0.038 U	0.038 U	0.038 U
Benzo(a)anthracene	mg/kg	11.1 U	0.718	0.037 U	0.037 U
Benzo(a)pyrene	mg/kg	13.2 U	0.651	0.044 U	0.044 U
Benzo(b)fluoranthene	mg/kg	22.5 U	0.754	0.075 U	0.075 U
Benzo(g,h,i)perylene	mg/kg	18.9 U	0.304	0.063 U	0.063 U
Benzo(k)fluoranthene	mg/kg	18 U	0.307	0.06 U	0.06 U
Benzoic acid	mg/kg	139 U	0.463 U	0.463 U	0.463 U
Benzyl alcohol	mg/kg	112 U	0.372 U	0.372 U	0.372 U
bis(2-Chloroethoxy)methane	mg/kg	27.6 U	0.092 U	0.092 U	0.092 U
bis(2-Chloroethyl)ether	mg/kg	37.2 U	0.124 U	0.124 U	0.124 U
bis(2-Chloroisopropyl)ether	mg/kg	36.3 U	0.121 U	0.121 U	0.121 U
bis(2-Ethylhexyl)phthalate	mg/kg	55.8 U	1.65	0.186 U	0.186 U
4-Bromophenyl-phenylether	mg/kg	21.3 U	0.071 U	0.071 U	0.071 U
Butylbenzylphthalate	mg/kg	47.1 U	0.157 U	0.157 U	0.157 U
Carbazole	mg/kg	177 U	0.59 U	0.59 U	0.59 U
4-Chloro-3-methylphenol	mg/kg	138 U	0.459 U	N/A I	N/A I
4-Chloroaniline	mg/kg	36.3 U	0.121 U	0.121 U	0.121 U
2-Chloronaphthalene	mg/kg	64.5 U	0.215 U	0.215 U	0.215 U
2-Chlorophenol	mg/kg	195 U	0.651 U	N/A I	N/A I

Analysis / Analyte	Units	1-__	11-__	12-__	13-__
4-Chlorophenyl-phenylether	mg/kg	24.9 U	0.083 U	0.083 U	0.083 U
Chrysene	mg/kg	15.6 U	1.64	0.052 U	0.052 U
Di-n-butylphthalate	mg/kg	71.1 U	0.237 U	0.237 U	0.237 U
Di-n-octylphthalate	mg/kg	58.2 U	0.194 U	0.194 U	0.194 U
Dibenz(a,h)anthracene	mg/kg	18.9 U	0.063 U	0.063 U	0.063 U
Dibenzofuran	mg/kg	54.3 U	0.181 U	0.181 U	0.181 U
1,2-Dichlorobenzene	mg/kg	75.9 U	0.253 U	0.253 U	0.253 U
1,3-Dichlorobenzene	mg/kg	66.3 U	0.221 U	0.221 U	0.221 U
1,4-Dichlorobenzene	mg/kg	66 U	0.22 U	0.22 U	0.22 U
3,3'-Dichlorobenzidine	mg/kg	143 U	0.476 U	0.476 U	0.476 U
2,4-Dichlorophenol	mg/kg	115 U	0.383 U	N/A I	N/A I
Diethylphthalate	mg/kg	28.5 U	0.095 U	0.095 U	0.095 U
2,4-Dimethylphenol	mg/kg	171 U	0.57 U	N/A I	N/A I
Dimethylphthalate	mg/kg	25.8 U	0.086 U	0.086 U	0.086 U
4,6-Dinitro-2-methylphenol	mg/kg	148 U	0.493 U	N/A I	N/A I
2,4-Dinitrophenol	mg/kg	140 U	0.467 U	N/A I	N/A I
2,4-Dinitrotoluene	mg/kg	60.9 U	0.203 U	0.203 U	0.203 U
2,6-Dinitrotoluene	mg/kg	54.3 U	0.181 U	0.181 U	0.181 U
Fluoranthene	mg/kg	13.8 U	1.04	0.498	0.153
Fluorene	mg/kg	11.1 U	0.037 U	0.037 U	0.037 U
Hexachlorobenzene	mg/kg	114 U	0.381 U	0.381 U	0.381 U
Hexachlorobutadiene	mg/kg	65.7 U	0.219 U	0.219 U	0.219 U
Hexachlorocyclopentadiene	mg/kg	52.8 U	0.176 U	0.176 U	0.176 U
Hexachloroethane	mg/kg	71.1 U	0.237 U	0.237 U	0.237 U
Indeno(1,2,3-cd)pyrene	mg/kg	19.8 U	0.066 U	0.066 U	0.066 U
Isophorone	mg/kg	52.5 U	0.175 U	0.762	0.175 U
2-Methylnaphthalene	mg/kg	51.9 U	0.253	0.173 U	0.173 U
2-Methylphenol	mg/kg	212 U	0.707 U	N/A I	N/A I
4-Methylphenol	mg/kg	169 U	0.563 U	N/A I	N/A I
Naphthalene	mg/kg	12.9 U	0.043 U	0.043 U	0.043 U
2-Nitroaniline	mg/kg	61.8 U	0.206 U	0.206 U	0.206 U
3-Nitroaniline	mg/kg	53.1 U	0.177 U	0.177 U	0.177 U
4-Nitroaniline	mg/kg	42.3 U	0.141 U	0.141 U	0.141 U
Nitrobenzene	mg/kg	38.7 U	0.129 U	0.129 U	0.129 U
2-Nitrophenol	mg/kg	116 U	0.385 U	N/A I	N/A I
4-Nitrophenol	mg/kg	208 U	0.692 U	N/A I	N/A I
N-nitroso-di-n-propylamine	mg/kg	45.6 U	0.152 U	0.152 U	0.152 U
N-nitrosodiphenylamine	mg/kg	26.7 U	0.228	0.089 U	0.089 U
Pentachlorophenol	mg/kg	145 U	0.64	N/A I	N/A I
Phenanthrene	mg/kg	10.5 U	0.949	0.656	0.071
Phenol	mg/kg	168 U	0.561 U	N/A I	N/A I
Pyrene	mg/kg	11.1 U	1.86	1.49	0.135
1,2,4-Trichlorobenzene	mg/kg	42.6 U	0.142 U	0.142 U	0.142 U
2,4,5-Trichlorophenol	mg/kg	145 U	0.482 U	N/A I	N/A I
2,4,6-Trichlorophenol	mg/kg	174 U	0.58 U	N/A I	N/A I
VOCs in Solid Hazardous Matrices by GC/MS					
Acetone	mg/kg	3.4 U			
Benzene	mg/kg	0.028 U			
Bromodichloromethane	mg/kg	0.021 U			
Bromoform	mg/kg	0.045 U			

Analysis / Analyte	Units	1-__	11-__	12-__	13-__
Bromomethane	mg/kg	0.078 U			
2-Butanone	mg/kg	1.8 U			
Carbon Disulfide	mg/kg	0.096 U			
Carbon Tetrachloride	mg/kg	0.025 U			
Chlorobenzene	mg/kg	0.036 U			
Chloroethane	mg/kg	0.1 U			
Chloroform	mg/kg	0.021 U			
Chloromethane	mg/kg	0.028 U			
Dibromochloromethane	mg/kg	0.029 U			
1,2-Dichlorobenzene	mg/kg	0.034 U			
1,3-Dichlorobenzene	mg/kg	0.028 U			
1,4-Dichlorobenzene	mg/kg	0.035 U			
1,1-Dichloroethane	mg/kg	0.02 U			
1,2-Dichloroethane	mg/kg	0.024 U			
1,1-Dichloroethene	mg/kg	0.051 U			
cis-1,2-Dichloroethene	mg/kg	0.038 U			
trans-1,2-Dichloroethene	mg/kg	0.026 U			
1,2-Dichloropropane	mg/kg	0.03 U			
cis-1,3-Dichloropropene	mg/kg	0.026 U			
trans-1,3-Dichloropropene	mg/kg	0.024 U			
Ethyl Benzene	mg/kg	0.026 U			
2-Hexanone	mg/kg	0.69 U			
Methylene Chloride	mg/kg	188 U			
4-Methyl-2-Pentanone	mg/kg	0.41 U			
Styrene	mg/kg	0.026 U			
1,1,2,2-Tetrachloroethane	mg/kg	0.05 U			
Tetrachloroethene	mg/kg	0.088 U			
Toluene	mg/kg	0.026 U			
1,1,1-Trichloroethane	mg/kg	0.049 U			
1,1,2-Trichloroethane	mg/kg	0.029 U			
Trichloroethene	mg/kg	0.034 U			
Vinyl Chloride	mg/kg	0.088 U			
m and/or p-Xylene	mg/kg	0.054 U			
o-Xylene	mg/kg	0.039 U			

Analysis / Analyte	Units	14-__	15-__	16-__	101-__
PCBs in Hazardous by GC/EC					
Aroclor 1016	mg/kg	0.0074 U	0.0074 U	0.0074 U	
Aroclor 1221	mg/kg	0.014 U	0.014 U	0.014 U	
Aroclor 1232	mg/kg	0.0083 U	0.0083 U	0.0083 U	
Aroclor 1242	mg/kg	0.0093 U	0.0093 U	0.0093 U	
Aroclor 1248	mg/kg	2.1 J	0.32 J	1.9 J	
Aroclor 1254	mg/kg	0.0043 U	0.0043 U	0.0043 U	
Aroclor 1260	mg/kg	0.0055 U	0.41	0.0055 U	
PCDD/PCDF in Hazardous by GC/HRMS					
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	25.6	2.13	16.4	
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	ng/kg	54 U	4.94 U	35	
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	160	4.94 U	183	
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	1520	20.9	6970	
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	384	7.34	1570	
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	5920	124	13000	
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxi	ng/kg	14800	652	12000	
2,3,7,8-Tetrachlorodibenzo-p-furan	ng/kg	2.13	0.988 U	2.9	
1,2,3,7,8-Pentachlorodibenzo-p-furan	ng/kg	110 U	4.94 U	20 U	
2,3,4,7,8-Pentachlorodibenzo-p-furan	ng/kg	20 U	4.94 U	7.12	
1,2,3,4,7,8-Hexachlorodibenzo-p-furan	ng/kg	15.3	4.94 U	20.3	
1,2,3,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	11.9	4.94 U	24	
1,2,3,7,8,9-Hexachlorodibenzo-p-furan	ng/kg	5.2 U	4.94 U	6.72	
2,3,4,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	37.7	4.94 U	47.3	
1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan	ng/kg	1360	26.3	2200	
1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan	ng/kg	36.1	4.94 U	49.5	
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-furan	ng/kg	1100	21.9	1610	
2,3,7,8-Dioxin Total Equivalents	ng/kg	327	7.13	1090	
Semi-Volatile Organic Compounds in Hazardous Waste					
Acenaphthene	mg/kg	0.051 U	0.051 U	0.051 U	
Acenaphthylene	mg/kg	0.031 U	0.031 U	0.031 U	
Anthracene	mg/kg	0.038 U	0.038 U	0.038 U	
Benzo(a)anthracene	mg/kg	0.3	0.037 U	0.037 U	
Benzo(a)pyrene	mg/kg	0.56	0.044 U	0.044 U	
Benzo(b)fluoranthene	mg/kg	1.11	0.075 U	0.075 U	
Benzo(g,h,i)perylene	mg/kg	0.335	0.063 U	0.063 U	
Benzo(k)fluoranthene	mg/kg	0.58	0.06 U	0.06 U	
Benzoic acid	mg/kg	0.463 U	0.463 U	0.463 U	
Benzyl alcohol	mg/kg	0.372 U	0.372 U	0.372 U	
bis(2-Chloroethoxy)methane	mg/kg	0.092 U	0.092 U	0.092 U	
bis(2-Chloroethyl)ether	mg/kg	0.124 U	0.124 U	0.124 U	
bis(2-Chloroisopropyl)ether	mg/kg	0.121 U	0.121 U	0.121 U	
bis(2-Ethylhexyl)phthalate	mg/kg	0.186 U	0.186 U	0.186 U	
4-Bromophenyl-phenylether	mg/kg	0.071 U	0.071 U	0.071 U	
Butylbenzylphthalate	mg/kg	0.157 U	0.157 U	0.157 U	
Carbazole	mg/kg	0.59 U	0.59 U	0.59 U	
4-Chloro-3-methylphenol	mg/kg	N/A I	N/A I	N/A I	
4-Chloroaniline	mg/kg	0.121 U	0.121 U	0.121 U	
2-Chloronaphthalene	mg/kg	0.215 U	0.215 U	0.215 U	
2-Chlorophenol	mg/kg	N/A I	N/A I	N/A I	

Analysis / Analyte	Units	14-__	15-__	16-__	101-__
4-Chlorophenyl-phenylether	mg/kg	0.083 U	0.083 U	0.083 U	
Chrysene	mg/kg	1.36	0.052 U	0.052 U	
Di-n-butylphthalate	mg/kg	0.237 U	0.237 U	0.237 U	
Di-n-octylphthalate	mg/kg	0.194 U	0.194 U	0.194 U	
Dibenz(a,h)anthracene	mg/kg	0.063 U	0.063 U	0.063 U	
Dibenzofuran	mg/kg	0.181 U	0.181 U	0.181 U	
1,2-Dichlorobenzene	mg/kg	0.253 U	0.253 U	0.253 U	
1,3-Dichlorobenzene	mg/kg	0.221 U	0.221 U	0.221 U	
1,4-Dichlorobenzene	mg/kg	0.22 U	0.22 U	0.22 U	
3,3'-Dichlorobenzidine	mg/kg	0.476 U	0.476 U	0.476 U	
2,4-Dichlorophenol	mg/kg	N/A I	N/A I	N/A I	
Diethylphthalate	mg/kg	0.095 U	0.095 U	0.095 U	
2,4-Dimethylphenol	mg/kg	N/A I	N/A I	N/A I	
Dimethylphthalate	mg/kg	0.086 U	0.086 U	0.086 U	
4,6-Dinitro-2-methylphenol	mg/kg	N/A I	0.493 U	N/A I	
2,4-Dinitrophenol	mg/kg	N/A I	N/A I	N/A I	
2,4-Dinitrotoluene	mg/kg	0.203 U	0.203 U	0.203 U	
2,6-Dinitrotoluene	mg/kg	0.181 U	0.181 U	0.181 U	
Fluoranthene	mg/kg	1.95	0.046 U	0.046 U	
Fluorene	mg/kg	0.037 U	0.037 U	0.037 U	
Hexachlorobenzene	mg/kg	0.381 U	0.381 U	0.381 U	
Hexachlorobutadiene	mg/kg	0.219 U	0.219 U	0.219 U	
Hexachlorocyclopentadiene	mg/kg	0.176 U	0.176 U	0.176 U	
Hexachloroethane	mg/kg	0.237 U	0.237 U	0.237 U	
Indeno(1,2,3-cd)pyrene	mg/kg	0.066 U	0.066 U	0.066 U	
Isophorone	mg/kg	0.175 U	0.175 U	0.175 U	
2-Methylnaphthalene	mg/kg	0.173 U	0.173 U	0.173 U	
2-Methylphenol	mg/kg	N/A I	N/A I	N/A I	
4-Methylphenol	mg/kg	N/A I	N/A I	N/A I	
Naphthalene	mg/kg	0.043 U	0.043 U	0.043 U	
2-Nitroaniline	mg/kg	0.206 U	0.206 U	0.206 U	
3-Nitroaniline	mg/kg	0.177 U	0.177 U	0.177 U	
4-Nitroaniline	mg/kg	0.141 U	0.141 U	0.141 U	
Nitrobenzene	mg/kg	0.129 U	0.129 U	0.129 U	
2-Nitrophenol	mg/kg	N/A I	N/A I	N/A I	
4-Nitrophenol	mg/kg	N/A I	N/A I	N/A I	
N-nitroso-di-n-propylamine	mg/kg	0.152 U	0.152 U	0.152 U	
N-nitrosodiphenylamine	mg/kg	0.089 U	0.089 U	0.089 U	
Pentachlorophenol	mg/kg	N/A I	N/A I	N/A I	
Phenanthrene	mg/kg	0.556	0.035 U	0.102	
Phenol	mg/kg	N/A I	N/A I	N/A I	
Pyrene	mg/kg	1.54	0.037 U	0.037 U	
1,2,4-Trichlorobenzene	mg/kg	0.142 U	0.142 U	0.142 U	
2,4,5-Trichlorophenol	mg/kg	N/A I	N/A I	N/A I	
2,4,6-Trichlorophenol	mg/kg	N/A I	N/A I	N/A I	
PCBs in Soil by GC/EC					
Aroclor 1016	ug/kg				41 U
Aroclor 1221	ug/kg				83 U
Aroclor 1232	ug/kg				41 U
Aroclor 1242	ug/kg				41 U

Analysis / Analyte	Units	14-__	15-__	16-__	101-__
Aroclor 1248	ug/kg				41 U
Aroclor 1254	ug/kg				41 U
Aroclor 1260	ug/kg				41 U
PCDD/PCDF in Soil by GC/HRMS					
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg				1.00 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	ng/kg				5.00 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg				5.00 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg				5.00 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg				5.00 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg				42.1
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxi	ng/kg				9050
2,3,7,8-Tetrachlorodibenzo-p-furan	ng/kg				1.00 U
1,2,3,7,8-Pentachlorodibenzo-p-furan	ng/kg				5.00 U
2,3,4,7,8-Pentachlorodibenzo-p-furan	ng/kg				5.00 U
1,2,3,4,7,8-Hexachlorodibenzo-p-furan	ng/kg				5.00 U
1,2,3,6,7,8-Hexachlorodibenzo-p-furan	ng/kg				5.00 U
1,2,3,7,8,9-Hexachlorodibenzo-p-furan	ng/kg				5.00 U
2,3,4,6,7,8-Hexachlorodibenzo-p-furan	ng/kg				5.00 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan	ng/kg				5.00 U
1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan	ng/kg				5.00 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-furan	ng/kg				10.0 U
2,3,7,8-Dioxin Total Equivalents	ng/kg				1.33
Semi-Volatile Organic Compounds in Soil					
Acenaphthene	ug/kg				410 U
Acenaphthylene	ug/kg				410 U
Acetophenone	ug/kg				410 U
Anthracene	ug/kg				410 U
Atrazine	ug/kg				410 U
Benzaldehyde	ug/kg				410 U
Benzo(a)anthracene	ug/kg				760
Benzo(a)pyrene	ug/kg				740
Benzo(b)fluoranthene	ug/kg				720
Benzo(g,h,i)perylene	ug/kg				550
Benzo(k)fluoranthene	ug/kg				660
Biphenyl	ug/kg				410 U
bis(2-Chloroethoxy)methane	ug/kg				410 U
bis(2-Chloroethyl)ether	ug/kg				410 U
bis(2-Chloroisopropyl)ether	ug/kg				410 U
bis(2-Ethylhexyl)phthalate	ug/kg				680 U
4-Bromophenyl-phenylether	ug/kg				410 U
Butylbenzylphthalate	ug/kg				410 U
Caprolactam	ug/kg				410 U
Carbazole	ug/kg				410 U
4-Chloro-3-methylphenol	ug/kg				410 U
4-Chloroaniline	ug/kg				410 U
2-Chloronaphthalene	ug/kg				410 U
2-Chlorophenol	ug/kg				410 U
4-Chlorophenyl-phenylether	ug/kg				410 U
Chrysene	ug/kg				870

Analysis / Analyte	Units	14-__	15-__	16-__	101-__
Di-n-butylphthalate	ug/kg				410 U
Di-n-octylphthalate	ug/kg				410 U
Dibenz(a,h)anthracene	ug/kg				410 U
Dibenzofuran	ug/kg				410 U
3,3'-Dichlorobenzidine	ug/kg				410 U
2,4-Dichlorophenol	ug/kg				410 U
Diethylphthalate	ug/kg				410 U
2,4-Dimethylphenol	ug/kg				410 U
Dimethylphthalate	ug/kg				410 U
4,6-Dinitro-2-methylphenol	ug/kg				1000 U
2,4-Dinitrophenol	ug/kg				1000 U
2,4-Dinitrotoluene	ug/kg				410 U
2,6-Dinitrotoluene	ug/kg				410 U
Fluoranthene	ug/kg				1400
Fluorene	ug/kg				410 U
Hexachlorobenzene	ug/kg				410 U
Hexachlorobutadiene	ug/kg				410 U
Hexachlorocyclopentadiene	ug/kg				410 U
Hexachloroethane	ug/kg				410 U
Indeno(1,2,3-cd)pyrene	ug/kg				650
Isophorone	ug/kg				410 U
2-Methylnaphthalene	ug/kg				410 U
2-Methylphenol	ug/kg				410 U
4-Methylphenol	ug/kg				410 U
Naphthalene	ug/kg				410 U
2-Nitroaniline	ug/kg				1000 U
3-Nitroaniline	ug/kg				1000 U
4-Nitroaniline	ug/kg				1000 U
Nitrobenzene	ug/kg				410 U
2-Nitrophenol	ug/kg				410 U
4-Nitrophenol	ug/kg				1000 U
N-nitroso-di-n-propylamine	ug/kg				410 U
N-nitrosodiphenylamine	ug/kg				410 U
Pentachlorophenol	ug/kg				1000 U
Phenanthrene	ug/kg				410 U
Phenol	ug/kg				410 U
Pyrene	ug/kg				1300
2,4,5-Trichlorophenol	ug/kg				1000 U
2,4,6-Trichlorophenol	ug/kg				410 U
VOC's in Soil at Low Levels by GC/MS Closed-System Purge-and-Trap					
Acetone	ug/kg				11 U
Benzene	ug/kg				10 U
Bromodichloromethane	ug/kg				10 U
Bromoform	ug/kg				10 U
Bromomethane	ug/kg				10 U
2-Butanone	ug/kg				10 U
Carbon Disulfide	ug/kg				10 U
Carbon Tetrachloride	ug/kg				10 U
Chlorobenzene	ug/kg				10 U
Chloroethane	ug/kg				10 U

Analysis / Analyte	Units	14-__	15-__	16-__	101-__
Chloroform	ug/kg				10 U
Chloromethane	ug/kg				10 U
Cyclohexane	ug/kg				10 U
1,2-Dibromo-3-Chloropropane	ug/kg				N/A I
Dibromochloromethane	ug/kg				10 U
1,2-Dibromoethane	ug/kg				10 U
1,2-Dichlorobenzene	ug/kg				10 U
1,3-Dichlorobenzene	ug/kg				10 U
1,4-Dichlorobenzene	ug/kg				10 U
Dichlorodifluoromethane	ug/kg				10 U
1,1-Dichloroethane	ug/kg				10 U
1,2-Dichloroethane	ug/kg				10 U
1,1-Dichloroethene	ug/kg				10 U
cis-1,2-Dichloroethene	ug/kg				12
trans-1,2-Dichloroethene	ug/kg				10 U
1,2-Dichloropropane	ug/kg				10 U
cis-1,3-Dichloropropene	ug/kg				10 U
trans-1,3-Dichloropropene	ug/kg				10 U
Ethyl Benzene	ug/kg				10 U
2-Hexanone	ug/kg				10 U
Isopropylbenzene	ug/kg				10 U
Methyl Acetate	ug/kg				10 U
Methyl tert-butyl ether	ug/kg				10 U
Methylcyclohexane	ug/kg				10 U
Methylene Chloride	ug/kg				10 U
4-Methyl-2-Pentanone	ug/kg				10 U
Styrene	ug/kg				10 U
1,1,2,2-Tetrachloroethane	ug/kg				10 U
Tetrachloroethene	ug/kg				10 U
Toluene	ug/kg				10 U
1,2,4-Trichlorobenzene	ug/kg				10 U
1,1,1-Trichloroethane	ug/kg				10 U
1,1,2-Trichloroethane	ug/kg				10 U
Trichloroethene	ug/kg				27
Trichlorofluoromethane	ug/kg				10 U
1,1,2-Trichlorotrifluoroethane	ug/kg				10 U
Vinyl Chloride	ug/kg				10 U
total Xylene	ug/kg				10 U

Analysis / Analyte	Units	102-__	103-__	104-__	105-__
PCBs in Soil by GC/EC					
Aroclor 1016	ug/kg	40 U	40 U	440 U	41 U
Aroclor 1221	ug/kg	82 U	81 U	890 U	83 U
Aroclor 1232	ug/kg	40 U	40 U	440 U	41 U
Aroclor 1242	ug/kg	40 U	40 U	440 U	41 U
Aroclor 1248	ug/kg	40 U	40 U	3600	1000
Aroclor 1254	ug/kg	40 U	40 U	1900	440 J
Aroclor 1260	ug/kg	40 U	40 U	440 U	41 U
PCDD/PCDF in Soil by GC/HRMS					
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	0.980 U	0.952 U	1.29	2.72
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	ng/kg	4.90 U	4.76 U	8.30	5.53
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	4.90 U	4.76 U	16.6 J	4.95 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	4.90 U	10.8	821	70.5
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	4.90 U	4.85	106	25.4
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	4.90 U	132	8390	1190
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxi	ng/kg	167	19300	30200	23200
2,3,7,8-Tetrachlorodibenzo-p-furan	ng/kg	0.980 U	0.952 U	26.7 J	2.07 J
1,2,3,7,8-Pentachlorodibenzo-p-furan	ng/kg	4.90 U	4.76 U	10.1	4.95 U
2,3,4,7,8-Pentachlorodibenzo-p-furan	ng/kg	4.90 U	4.76 U	33.3	4.95 U
1,2,3,4,7,8-Hexachlorodibenzo-p-furan	ng/kg	4.90 U	4.76 U	209	4.95 U
1,2,3,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	4.90 U	4.76 U	152	4.95 U
1,2,3,7,8,9-Hexachlorodibenzo-p-furan	ng/kg	4.90 U	4.76 U	8.03	4.95 U
2,3,4,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	4.90 U	4.76 U	235	4.95 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan	ng/kg	4.90 U	15.2 J	19100 J	456
1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan	ng/kg	4.90 U	4.76 U	406	12.4
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-furan	ng/kg	9.80 U	12.4	17900 J	540
2,3,7,8-Dioxin Total Equivalents	ng/kg	0.017	4.96	468	37.0
Semi-Volatile Organic Compounds in Soil					
Acenaphthene	ug/kg	400 U	400 U	13000 U	4100 U
Acenaphthylene	ug/kg	400 U	400 U	13000 U	4100 U
Acetophenone	ug/kg	400 U	400 U	13000 U	4100 U
Anthracene	ug/kg	400 U	400 U	13000 U	4100 U
Atrazine	ug/kg	400 U	400 U	13000 U	4100 U
Benzaldehyde	ug/kg	400 U	400 U	13000 U	4100 U
Benzo(a)anthracene	ug/kg	400 U	400 U	13000 U	4100 U
Benzo(a)pyrene	ug/kg	400 U	400 U	13000 U	4100 U
Benzo(b)fluoranthene	ug/kg	400 U	400 U	13000 U	4100 U
Benzo(g,h,i)perylene	ug/kg	400 U	400 U	13000 U	4100 U
Benzo(k)fluoranthene	ug/kg	400 U	400 U	13000 U	4100 U
Biphenyl	ug/kg	400 U	400 U	13000 U	4100 U
bis(2-Chloroethoxy)methane	ug/kg	400 U	400 U	13000 U	4100 U
bis(2-Chloroethyl)ether	ug/kg	400 U	400 U	13000 U	4100 U
bis(2-Chloroisopropyl)ether	ug/kg	400 U	400 U	13000 U	4100 U
bis(2-Ethylhexyl)phthalate	ug/kg	400 U	600 U	13000 U	4100 U
4-Bromophenyl-phenylether	ug/kg	400 U	400 U	13000 U	4100 U
Butylbenzylphthalate	ug/kg	400 U	400 U	13000 U	4100 U
Caprolactam	ug/kg	400 U	400 U	13000 U	4100 U
Carbazole	ug/kg	400 U	400 U	13000 U	4100 U
4-Chloro-3-methylphenol	ug/kg	400 U	400 U	13000 U	4100 U

Analysis / Analyte	Units	102-__	103-__	104-__	105-__
4-Chloroaniline	ug/kg	400 U	400 U	13000 U	4100 U
2-Chloronaphthalene	ug/kg	400 U	400 U	13000 U	4100 U
2-Chlorophenol	ug/kg	400 U	400 U	13000 U	4100 U
4-Chlorophenyl-phenylether	ug/kg	400 U	400 U	13000 U	4100 U
Chrysene	ug/kg	400 U	400 U	13000 U	4100 U
Di-n-butylphthalate	ug/kg	400 U	400 U	13000 U	4100 U
Di-n-octylphthalate	ug/kg	400 U	400 U	13000 U	4100 U
Dibenz(a,h)anthracene	ug/kg	400 U	400 U	13000 U	4100 U
Dibenzofuran	ug/kg	400 U	400 U	13000 U	4100 U
3,3'-Dichlorobenzidine	ug/kg	400 U	400 U	13000 U	4100 U
2,4-Dichlorophenol	ug/kg	400 U	400 U	13000 U	4100 U
Diethylphthalate	ug/kg	400 U	400 U	13000 U	4100 U
2,4-Dimethylphenol	ug/kg	400 U	400 U	13000 U	4100 U
Dimethylphthalate	ug/kg	400 U	400 U	13000 U	4100 U
4,6-Dinitro-2-methylphenol	ug/kg	1000 U	1000 U	33000 U	10000 U
2,4-Dinitrophenol	ug/kg	1000 U	1000 U	33000 U	10000 U
2,4-Dinitrotoluene	ug/kg	400 U	400 U	13000 U	4100 U
2,6-Dinitrotoluene	ug/kg	400 U	400 U	13000 U	4100 U
Fluoranthene	ug/kg	400 U	400 U	13000 U	4100 U
Fluorene	ug/kg	400 U	400 U	13000 U	4100 U
Hexachlorobenzene	ug/kg	400 U	400 U	13000 U	4100 U
Hexachlorobutadiene	ug/kg	400 U	400 U	13000 U	4100 U
Hexachlorocyclopentadiene	ug/kg	400 U	400 U	13000 U	4100 U
Hexachloroethane	ug/kg	400 U	400 U	13000 U	4100 U
Indeno(1,2,3-cd)pyrene	ug/kg	400 U	400 U	13000 U	4100 U
Isophorone	ug/kg	400 U	400 U	13000 U	4100 U
2-Methylnaphthalene	ug/kg	400 U	400 U	13000 U	4100 U
2-Methylphenol	ug/kg	400 U	400 U	13000 U	4100 U
4-Methylphenol	ug/kg	400 U	400 U	13000 U	4100 U
Naphthalene	ug/kg	400 U	400 U	13000 U	4100 U
2-Nitroaniline	ug/kg	1000 U	1000 U	33000 U	10000 U
3-Nitroaniline	ug/kg	1000 U	1000 U	33000 U	10000 U
4-Nitroaniline	ug/kg	1000 U	1000 U	33000 U	10000 U
Nitrobenzene	ug/kg	400 U	400 U	13000 U	4100 U
2-Nitrophenol	ug/kg	400 U	400 U	13000 U	4100 U
4-Nitrophenol	ug/kg	1000 U	1000 U	33000 U	10000 U
N-nitroso-di-n-propylamine	ug/kg	400 U	400 U	13000 U	4100 U
N-nitrosodiphenylamine	ug/kg	400 U	400 U	13000 U	4100 U
Pentachlorophenol	ug/kg	1000 U	1000 U	33000 U	10000 U
Phenanthrene	ug/kg	400 U	400 U	13000 U	4100 U
Phenol	ug/kg	400 U	400 U	13000 U	4100 U
Pyrene	ug/kg	400 U	400 U	13000 U	4100 U
2,4,5-Trichlorophenol	ug/kg	1000 U	1000 U	33000 U	10000 U
2,4,6-Trichlorophenol	ug/kg	400 U	400 U	13000 U	4100 U
VOC's in Soil at Low Levels by GC/MS Closed-System Purge-and-Trap					
Acetone	ug/kg	10 U	14 U	29 U	67 J
Benzene	ug/kg	10 U	10 U	10 U	10 U
Bromodichloromethane	ug/kg	10 U	10 U	10 U	10 U
Bromoform	ug/kg	10 U	10 U	10 U	10 U
Bromomethane	ug/kg	10 U	10 U	10 U	10 U

Analysis / Analyte	Units	102-__	103-__	104-__	105-__
2-Butanone	ug/kg	10 U	10 U	10 U	19 J
Carbon Disulfide	ug/kg	10 U	10 U	10 U	10 U
Carbon Tetrachloride	ug/kg	10 U	10 U	10 U	10 U
Chlorobenzene	ug/kg	10 U	10 U	10 U	10 U
Chloroethane	ug/kg	10 U	10 U	10 U	10 U
Chloroform	ug/kg	10 U	10 U	10 U	10 U
Chloromethane	ug/kg	10 U	10 U	10 U	10 U
Cyclohexane	ug/kg	10 U	10 U	10 U	10 U
1,2-Dibromo-3-Chloropropane	ug/kg	N/A I	N/A I	N/A I	N/A I
Dibromochloromethane	ug/kg	10 U	10 U	10 U	10 U
1,2-Dibromoethane	ug/kg	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	ug/kg	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	ug/kg	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	ug/kg	10 U	10 U	10 U	10 U
Dichlorodifluoromethane	ug/kg	10 U	10 U	10 U	10 U
1,1-Dichloroethane	ug/kg	10 U	10 U	10 U	10 U
1,2-Dichloroethane	ug/kg	10 U	10 U	10 U	10 U
1,1-Dichloroethene	ug/kg	10 U	10 U	10 U	10 U
cis-1,2-Dichloroethene	ug/kg	10 U	10 U	10 U	10 U
trans-1,2-Dichloroethene	ug/kg	10 U	10 U	10 U	10 U
1,2-Dichloropropane	ug/kg	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	ug/kg	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	ug/kg	10 U	10 U	10 U	10 U
Ethyl Benzene	ug/kg	10 U	10 U	10 U	10 U
2-Hexanone	ug/kg	10 U	10 U	10 U	10 U
Isopropylbenzene	ug/kg	10 U	10 U	10 U	10 U
Methyl Acetate	ug/kg	10 U	10 U	10 U	10 U
Methyl tert-butyl ether	ug/kg	10 U	10 U	10 U	10 U
Methylcyclohexane	ug/kg	10 U	10 U	10 U	10 U
Methylene Chloride	ug/kg	10 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	ug/kg	10 U	10 U	10 U	10 U
Styrene	ug/kg	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	ug/kg	10 U	10 U	10 U	10 U
Tetrachloroethene	ug/kg	10 U	10 U	10 U	10 U
Toluene	ug/kg	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	ug/kg	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	ug/kg	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	ug/kg	10 U	10 U	10 U	10 U
Trichloroethene	ug/kg	10 U	10 U	10 U	10 U
Trichlorofluoromethane	ug/kg	10 U	10 U	10 U	10 U
1,1,2-Trichlorotrifluoroethane	ug/kg	10 U	10 U	10 U	10 U
Vinyl Chloride	ug/kg	10 U	10 U	10 U	10 U
total Xylene	ug/kg	10 U	10 U	10 U	10 U

Analysis / Analyte	Units	106-__	107-FB
PCBs in Soil by GC/EC			
Aroclor 1016	ug/kg	43 U	
Aroclor 1221	ug/kg	88 U	
Aroclor 1232	ug/kg	43 U	
Aroclor 1242	ug/kg	43 U	
Aroclor 1248	ug/kg	43 U	
Aroclor 1254	ug/kg	43 U	
Aroclor 1260	ug/kg	43 U	
PCDD/PCDF in Soil by GC/HRMS			
2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg	0.943 U	
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	ng/kg	4.72 U	
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	4.72 U	
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	4.72 U	
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg	4.72 U	
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg	12.1	
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxi	ng/kg	2630	
2,3,7,8-Tetrachlorodibenzo-p-furan	ng/kg	0.943 U	
1,2,3,7,8-Pentachlorodibenzo-p-furan	ng/kg	4.72 U	
2,3,4,7,8-Pentachlorodibenzo-p-furan	ng/kg	4.72 U	
1,2,3,4,7,8-Hexachlorodibenzo-p-furan	ng/kg	4.72 U	
1,2,3,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	4.72 U	
1,2,3,7,8,9-Hexachlorodibenzo-p-furan	ng/kg	4.72 U	
2,3,4,6,7,8-Hexachlorodibenzo-p-furan	ng/kg	4.72 U	
1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan	ng/kg	4.72 U	
1,2,3,4,7,8,9-Heptachlorodibenzo-p-furan	ng/kg	4.72 U	
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-furan	ng/kg	9.43 U	
2,3,7,8-Dioxin Total Equivalents	ng/kg	0.384	
Semi-Volatile Organic Compounds in Soil			
Acenaphthene	ug/kg	8600 U	
Acenaphthylene	ug/kg	8600 U	
Acetophenone	ug/kg	8600 U	
Anthracene	ug/kg	8600 U	
Atrazine	ug/kg	8600 U	
Benzaldehyde	ug/kg	8600 U	
Benzo(a)anthracene	ug/kg	8600 U	
Benzo(a)pyrene	ug/kg	8600 U	
Benzo(b)fluoranthene	ug/kg	8600 U	
Benzo(g,h,i)perylene	ug/kg	8600 U	
Benzo(k)fluoranthene	ug/kg	8600 U	
Biphenyl	ug/kg	8600 U	
bis(2-Chloroethoxy)methane	ug/kg	8600 U	
bis(2-Chloroethyl)ether	ug/kg	8600 U	
bis(2-Chloroisopropyl)ether	ug/kg	8600 U	
bis(2-Ethylhexyl)phthalate	ug/kg	8600 U	
4-Bromophenyl-phenylether	ug/kg	8600 U	
Butylbenzylphthalate	ug/kg	8600 U	
Caprolactam	ug/kg	8600 U	
Carbazole	ug/kg	8600 U	
4-Chloro-3-methylphenol	ug/kg	8600 U	

Analysis / Analyte	Units	106-__	107-FB
4-Chloroaniline	ug/kg	8600 U	
2-Chloronaphthalene	ug/kg	8600 U	
2-Chlorophenol	ug/kg	8600 U	
4-Chlorophenyl-phenylether	ug/kg	8600 U	
Chrysene	ug/kg	8600 U	
Di-n-butylphthalate	ug/kg	8600 U	
Di-n-octylphthalate	ug/kg	8600 U	
Dibenz(a,h)anthracene	ug/kg	8600 U	
Dibenzofuran	ug/kg	8600 U	
3,3'-Dichlorobenzidine	ug/kg	8600 U	
2,4-Dichlorophenol	ug/kg	8600 U	
Diethylphthalate	ug/kg	8600 U	
2,4-Dimethylphenol	ug/kg	8600 U	
Dimethylphthalate	ug/kg	8600 U	
4,6-Dinitro-2-methylphenol	ug/kg	21000 U	
2,4-Dinitrophenol	ug/kg	21000 U	
2,4-Dinitrotoluene	ug/kg	8600 U	
2,6-Dinitrotoluene	ug/kg	8600 U	
Fluoranthene	ug/kg	8600 U	
Fluorene	ug/kg	8600 U	
Hexachlorobenzene	ug/kg	8600 U	
Hexachlorobutadiene	ug/kg	8600 U	
Hexachlorocyclopentadiene	ug/kg	8600 U	
Hexachloroethane	ug/kg	8600 U	
Indeno(1,2,3-cd)pyrene	ug/kg	8600 U	
Isophorone	ug/kg	8600 U	
2-Methylnaphthalene	ug/kg	8600 U	
2-Methylphenol	ug/kg	8600 U	
4-Methylphenol	ug/kg	8600 U	
Naphthalene	ug/kg	8600 U	
2-Nitroaniline	ug/kg	21000 U	
3-Nitroaniline	ug/kg	21000 U	
4-Nitroaniline	ug/kg	21000 U	
Nitrobenzene	ug/kg	8600 U	
2-Nitrophenol	ug/kg	8600 U	
4-Nitrophenol	ug/kg	21000 U	
N-nitroso-di-n-propylamine	ug/kg	8600 U	
N-nitrosodiphenylamine	ug/kg	8600 U	
Pentachlorophenol	ug/kg	21000 U	
Phenanthrene	ug/kg	8600 U	
Phenol	ug/kg	8600 U	
Pyrene	ug/kg	8600 U	
2,4,5-Trichlorophenol	ug/kg	21000 U	
2,4,6-Trichlorophenol	ug/kg	8600 U	
VOC's in Soil at Low Levels by GC/MS Closed-System Purge-and-Trap			
Acetone	ug/kg	10 U	11 U
Benzene	ug/kg	10 U	11 U
Bromodichloromethane	ug/kg	10 U	11 U
Bromoform	ug/kg	10 U	11 U
Bromomethane	ug/kg	10 U	11 U

Analysis / Analyte	Units	106-__	107-FB
2-Butanone	ug/kg	10 U	11 U
Carbon Disulfide	ug/kg	10 U	11 U
Carbon Tetrachloride	ug/kg	10 U	11 U
Chlorobenzene	ug/kg	10 U	11 U
Chloroethane	ug/kg	10 U	11 U
Chloroform	ug/kg	10 U	11 U
Chloromethane	ug/kg	10 U	11 U
Cyclohexane	ug/kg	10 U	11 U
1,2-Dibromo-3-Chloropropane	ug/kg	N/A I	N/A I
Dibromochloromethane	ug/kg	10 U	11 U
1,2-Dibromoethane	ug/kg	10 U	11 U
1,2-Dichlorobenzene	ug/kg	10 U	11 U
1,3-Dichlorobenzene	ug/kg	10 U	11 U
1,4-Dichlorobenzene	ug/kg	10 U	11 U
Dichlorodifluoromethane	ug/kg	10 U	11 U
1,1-Dichloroethane	ug/kg	10 U	11 U
1,2-Dichloroethane	ug/kg	10 U	11 U
1,1-Dichloroethene	ug/kg	10 U	11 U
cis-1,2-Dichloroethene	ug/kg	10 U	11 U
trans-1,2-Dichloroethene	ug/kg	10 U	11 U
1,2-Dichloropropane	ug/kg	10 U	11 U
cis-1,3-Dichloropropene	ug/kg	10 U	11 U
trans-1,3-Dichloropropene	ug/kg	10 U	11 U
Ethyl Benzene	ug/kg	10 U	11 U
2-Hexanone	ug/kg	10 U	11 U
Isopropylbenzene	ug/kg	10 U	11 U
Methyl Acetate	ug/kg	10 U	11 U
Methyl tert-butyl ether	ug/kg	10 U	11 U
Methylcyclohexane	ug/kg	10 U	11 U
Methylene Chloride	ug/kg	10 U	11 U
4-Methyl-2-Pentanone	ug/kg	10 U	11 U
Styrene	ug/kg	10 U	11 U
1,1,2,2-Tetrachloroethane	ug/kg	10 U	11 U
Tetrachloroethene	ug/kg	10 U	11 U
Toluene	ug/kg	10 U	11 U
1,2,4-Trichlorobenzene	ug/kg	10 U	11 U
1,1,1-Trichloroethane	ug/kg	10 U	11 U
1,1,2-Trichloroethane	ug/kg	10 U	11 U
Trichloroethene	ug/kg	10 U	11 U
Trichlorofluoromethane	ug/kg	10 U	11 U
1,1,2-Trichlorotrifluoroethane	ug/kg	10 U	11 U
Vinyl Chloride	ug/kg	10 U	11 U
total Xylene	ug/kg	10 U	11 U

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
Tom Lorenz	TFL7XX / ASR #1641	27 / 03 / 02	1 of 1

CONTENTS OF SHIPMENT

SAMPLE NUMBER	TYPE OF CONTAINERS: CUBITAINER	BOTTLE (500 ml)	BOTTLE	BOTTLE	VOA SET (2 VIALS EA)	SAMPLED MEDIA: water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS/OTHER INFORMATION (condition of samples upon receipt, other sample numbers, etc.)
	NUMBERS OF CONTAINERS PER SAMPLE NUMBER										
1641-1		2			1					X	Oil (liquid
1641-11		2								X	Pulverized concrete
1641-12		2								X	
1641-13		2								X	
1641-14		2								X	
1641-15		2								X	
1641-16		2								X	

Complete

Chr. Prep. Rec'd.
Ref. 3-5°C

DESCRIPTION OF SHIPMENT

___ PIECE(S) CONSISTING OF ___ BOX(ES)

1 ICE CHEST(S); OTHER ___

MODE OF SHIPMENT

___ COMMERCIAL CARRIER: ___

___ COURIER

X SAMPLER CONVEYED

(SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
[signature] SEALED UNSEALED	3/27/02	1330	Nicole Robida SEALED UNSEALED	[signature]
RELINQUISHED BY SEALED UNSEALED	DATE	TIME	RECEIVED BY SEALED UNSEALED	REASON FOR CHANGE OF CUSTODY
RELINQUISHED BY SEALED UNSEALED	DATE	TIME	RECEIVED BY SEALED UNSEALED	REASON FOR CHANGE OF CUSTODY

7-EPA-9262(Revised 5/85)

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
Tom Lorenz	TFL TYX / ASR #1641	21 / 05 / 02	1 of 1

CONTENTS OF SHIPMENT

SAMPLE NUMBER	TYPE OF CONTAINERS: CUBITAINER	BOTTLE	BOTTLE	BOTTLE	VOA SET (# VIALS EA)	SAMPLED MEDIA: water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS/OTHER INFORMATION (condition of samples upon receipt, other sample numbers, etc.)
	NUMBERS OF CONTAINERS PER SAMPLE NUMBER										
1641-101		2			1		X				
1641-102		2			1		X				
1641-103		4			2		X				Extra volume for MS/MSD
1641-104		2			1		X				
1641-107FB		2			1		X				
1641-105		2			1		X				

Additional samples to be delivered 8/23/02
ASR not completed

Cler. Temp. Recd @ 8.7°C

DESCRIPTION OF SHIPMENT

_____ PIECE(S) CONSISTING OF _____ BOX(ES)

1 ICE CHEST(S): OTHER _____

MODE OF SHIPMENT

X COMMERCIAL CARRIER: FedEx

___ COURIER

___ SAMPLER CONVEYED

836416567441
(SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
[signature] ☒ SEALED ☐ UNSEALED	8/21/02	1820	FedEx ☒ SEALED ☐ UNSEALED	Shipment
RELINQUISHED BY	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
FedEx ☐ SEALED ☐ UNSEALED	8/22/02	10:30	[signature] ☒ SEALED ☐ UNSEALED	Analysis
RELINQUISHED BY	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
☐ SEALED ☐ UNSEALED			☐ SEALED ☐ UNSEALED	

7-EPA-9262(Revised 5/85)

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
Tom Lorenz	TFL7YX / ASR #1641	23 / 08 / 02	1 of 1

CONTENTS OF SHIPMENT

SAMPLE NUMBER	TYPE OF CONTAINERS: CUBITAINER	BOTTLE (2 x 120 ml)	BOTTLE	BOTTLE	VOA SET (4 VIALS EA)	SAMPLED MEDIA: water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS/OTHER INFORMATION (condition of samples upon receipt, other sample numbers, etc.)
	NUMBERS OF CONTAINERS PER SAMPLE NUMBER										
1641-106		2			1		X				2 extra VOAs for QC

Not Complete

Clr. Temp. Recd @ 5.3° K

DESCRIPTION OF SHIPMENT

1 PIECE(S) CONSISTING OF ____ BOX(ES)

1 ICE CHEST(S); OTHER ____

MODE OF SHIPMENT

____ COMMERCIAL CARRIER: ____

____ COURIER

X SAMPLER CONVEYED

____ (SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
[signature] ☐ SEALED ☒ UNSEALED	8/23/02	930	[signature] ☐ SEALED ☐ UNSEALED	and log
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY

7-EPA-9262(Revised 5/85)

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1641 **Sample Number:** 1 **QC Code:** __ **Matrix:** Hazardous **Tag ID:** 1641-1-__

Activity Number: TFL7YX **Activity Leader:** Lorenz, Tom
Activity Desc: St. Louis (EX) AA Plant sampling
Location: St. Louis **State:** Missouri **Type:** Superfund
Superfund Name: ST LOUIS (EX) ARMY AMMUNITION PLANT - Site Evaluation/Disp **Site ID:** 07YX **Site OU:** 00

Location Desc: Split of URS# 02PD-01-0802

External Sample Number: _____

Expected Conc: Circle One: Low Medium (High)

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)
Start 8/27/02 8:55
End __/__/__ __:__

Laboratory Analyses: 2-40 mL VOA vial 4 Deg C 14 days VOCs in Liquid Hazardous Matrices by GC/MS

Container	Preservative	Holding Time	Analysis
1 - 8oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Hazardous Waste +PCBs
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Hazardous by GC/HRMS

Sample Comments: Oil mixed media sample

- split sample of URS# 02PD-01-0802
- location is in sump near pipe in southeast corner of Bldg 2.
- purple-black oily liquid. No water evident.

Sample collected by: [signature]

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1641 **Sample Number:** 11 **QC Code:** __ **Matrix:** Hazardous **Tag ID:** 1641-11-__

Activity Number: TFL7YX **Activity Leader:** Lorenz, Tom
Activity Desc: St. Louis (EX) AA Plant sampling
Location: St. Louis **State:** Missouri **Type:** Superfund
Superfund Name: ST LOUIS (EX) ARMY AMMUNITION PLANT - Site Evaluation/Disp **Site ID:** 07YX **Site OU:** 00

Location Desc: Split of URS# 02CS-01-0802

External Sample Number: _____

Expected Conc: Circle One: (Low) Medium High

Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)
Start 8/26/02 11:30
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Hazardous Waste +PCBs
~~2 - 40ml VOA vial~~	~~4 Deg C~~	~~14 Days~~	~~VOCs in Liquid Hazardous Matrices by GC/MS~~
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Hazardous by GC/HRMS

Sample Comments: Pulverized concrete sample

- Split sample of URS# 02CS-01-0802
- location is in northwest section of Bldg 2 between 3rd & 4th columns on the far west
- composited sample from many holes, 0-1" bgs

Sample collected by: _____

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1641 **Sample Number:** 12 **QC Code:** __ **Matrix:** Hazardous **Tag ID:** 1641-12-__

Activity Number: TFL7YX **Activity Leader:** Lorenz, Tom
Activity Desc: St. Louis (EX) AA Plant sampling
Location: St. Louis **State:** Missouri **Type:** Superfund
Superfund Name: ST LOUIS (EX) ARMY AMMUNITION PLANT - Site Evaluation/Disp **Site ID:** 07YX **Site OU:** 00

Location Desc: Split of URS# 07CS-04-0802

External Sample Number: _____

Expected Conc: Circle One: (Low) Medium High

Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)
Start 8/26/02 13:30
End ___ ___ ___ ___:___

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Hazardous Waste + PCBs
~~2 - 40mL VOA vial~~	~~4 Deg C~~	~~14 Days~~	~~VOCs in Liquid Hazardous Matrices by GC/MS~~
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Hazardous by GC/HRMS

Sample Comments: Pulverized concrete sample

- split sample of URS# 07CS-04-0802

- location on raised concrete between 7TH columns on the west side of the site.
- composited from ~ 25 holes 0-1" bgs

Sample collected by: _____

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1641 **Sample Number:** 13 **QC Code:** __ **Matrix:** Hazardous **Tag ID:** 1641-13-__

Activity Number: TFL7YX **Activity Leader:** Lorenz, Tom
Activity Desc: St. Louis (EX) AA Plant sampling
Location: St. Louis **State:** Missouri **Type:** Superfund
Superfund Name: ST LOUIS (EX) ARMY AMMUNITION PLANT - Site Evaluation/Disp **Site ID:** 07YX **Site OU:** 00

Location Desc: split of URS# 02CS-06-0802

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)
Start 8/26/02 14:30
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Hazardous Waste + PCBs
~~2 - 40ml VOA vial~~	~~4 Deg C~~	~~14 Days~~	~~VOCs in Liquid Hazardous Matrices by GC/MS~~
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Hazardous by GC/HRMS

Sample Comments: Pulverized concrete sample

- split sample of URS# 02CS-06-08-02
- collected from ~ 17 holes, 0-1" bgs.
- location is between columns 8 & 9 on (from the north) the east side - in middle of building

Sample collected by: _____

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1641 **Sample Number:** 14 **QC Code:** __ **Matrix:** Hazardous **Tag ID:** 1641-14-__

Activity Number: TFL7YX **Activity Leader:** Lorenz, Tom
Activity Desc: St. Louis (EX) AA Plant sampling
Location: St. Louis **State:** Missouri **Type:** Superfund
Superfund Name: ST LOUIS (EX) ARMY AMMUNITION PLANT - Site Evaluation/Disp **Site ID:** 07YX **Site OU:** 00

Location Desc: split of URS # 02CS-08-0802

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: **Date** **Time (24 Hr)**
Start 8/26/02 15:30
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Hazardous Waste + PCBs
~~2 - 40mL VOA vial~~	~~4 Deg C~~	14 Days	~~VOCs in Liquid Hazardous Matrices by GC/MS~~
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Hazardous by GC/HRMS

Sample Comments: Pulverized concrete sample

- split sample of URS# 02CS-08-0802
- location is between columns 8 & 9 from the north on the east side

Sample collected by: _____

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1641 **Sample Number:** 15 **QC Code:** __ **Matrix:** Hazardous **Tag ID:** 1641-15-__

Activity Number: TFL7YX **Activity Leader:** Lorenz, Tom
Activity Desc: St. Louis (EX) AA Plant sampling
Location: St. Louis **State:** Missouri **Type:** Superfund
Superfund Name: ST LOUIS (EX) ARMY AMMUNITION PLANT - Site Evaluation/Disp **Site ID:** 07YX **Site OU:** 00

Location Desc: Split of URS #02CS-10-0802

External Sample Number: _____

Expected Conc: Circle One: (Low) Medium High

Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)
Start 8/26/02 0910
End ___/___/___ 1020

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Hazardous Waste +PCBs
~~2 - 40mL VOA vial~~	~~4 Deg C~~	~~14 Days~~	~~VOCs in Liquid Hazardous Matrices by GC/MS~~
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Hazardous by GC/HRMS

Sample Comments: Pulverized concrete sample

- split sample of URS# 02CS-10-0802
- location is in southeast corner of Bldg 2 near the sump
- composited from ~ 16 holes, 0-1" bgs.

Sample collected by: _____

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1641 **Sample Number:** 16 **QC Code:** __ **Matrix:** Hazardous **Tag ID:** 1641-16-__

Activity Number: TFL7YX **Activity Leader:** Lorenz, Tom
Activity Desc: St. Louis (EX) AA Plant sampling
Location: St. Louis **State:** Missouri **Type:** Superfund
Superfund Name: ST LOUIS (EX) ARMY AMMUNITION PLANT - Site Evaluation/Disp **Site ID:** 07YX **Site OU:** 00

Location Desc: split of URS# 02CS-02-0802

External Sample Number: _____

Expected Conc: Circle One: (Low) Medium High

Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)
Start 8/16/02 16:55
End ~~__/__/__ __:__~~

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Hazardous Waste + PCBs
~~2 - 40ml VOA vial~~	~~4 Deg C~~	~~14 Days~~	~~VOCs in Liquid Hazardous Matrices by GC/MS~~
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Hazardous by GC/HRMS

Sample Comments: Pulverized concrete sample

- split sample of URS# 02CS-02-0802
- location is in northeast corner of Bldg 2 near 1st column from the north
- composited sample from ~16 holes, 0-1" bgs

Sample collected by: _____

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1641 **Sample Number:** 101 **QC Code:** __ **Matrix:** Soil **Tag ID:** 1641-101-__

Activity Number: TFL7YX **Activity Leader:** Lorenz, Tom
Activity Desc: St. Louis (EX) AA Plant sampling
Location: St. Louis **State:** Missouri **Type:** Superfund
Superfund Name: ST LOUIS (EX) ARMY AMMUNITION PLANT - Site Evaluation/Disp **Site ID:** 07YX **Site OU:** 00

Location Desc: Geoprobe location RDSB-10

External Sample Number: _____

Expected Conc: Circle One: (Low) Medium High

Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)
Start 8/20/02 12:14
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial (preserved/tared)	4 Deg C, H2O + sodium bisulfate (in vial)	14 Days	VOC's in Soil at Low Levels by GC/MS Closed-System Purge-and-Trap
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil + PCBs

Sample Comments: Soil sample

- Split sample of URS sample #
  RA-RDSB-10 (0-0.5)-0802
- in roadway between NW corner Bldg 5 and NE corner Bldg 6
- Brown silty clay/fill material

Sample collected by: [signature]

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1641 **Sample Number:** 102 **QC Code:** __ **Matrix:** Soil **Tag ID:** 1641-102-__

Activity Number: TFL7YX **Activity Leader:** Lorenz, Tom

Activity Desc: St. Louis (EX) AA Plant sampling

Location: St. Louis **State:** Missouri **Type:** Superfund

Superfund Name: ST LOUIS (EX) ARMY AMMUNITION PLANT - Site Evaluation/Disp **Site ID:** 07YX **Site OU:** 00

Location Desc: Geoprobe location RRSB-04

External Sample Number: _____

Expected Conc: Circle One: (Low) Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)

Start 8/21/02 12:05

End ___/___/___ ___:___

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial (preserved/tared)	4 Deg C, H2O + sodium bisulfate (in vial)	14 Days	VOC's in Soil at Low Levels by GC/MS Closed-System Purge-and-Trap
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil + PCBs

Sample Comments: Soil sample

- split sample of URS sample # RA-RRSB-04 (4-6)-0802
- 4-6' bgs interval
- in railroad tracks on north side of Bldg. 3.
- brown silty clay/fill material.

Sample collected by: _____

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1641 **Sample Number:** 103 **QC Code:** __ **Matrix:** Soil **Tag ID:** 1641-103-__

Activity Number: TFL7YX **Activity Leader:** Lorenz, Tom
Activity Desc: St. Louis (EX) AA Plant sampling
Location: St. Louis **State:** Missouri **Type:** Superfund
Superfund Name: ST LOUIS (EX) ARMY AMMUNITION PLANT - Site Evaluation/Disp **Site ID:** 07YX **Site OU:** 00

Location Desc: split of URS Sample # 02TS-03(0-0.5)-0802

External Sample Number: _____

Expected Conc: Circle One: (Low) Medium High

Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)
Start 8/21/02 15:05
End ___ ___

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial (preserved/tared)	4 Deg C, H2O + sodium bisulfate (in vial)	14 Days	VOC's in Soil at Low Levels by GC/MS Closed-System Purge-and-Trap
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil + PCBs

Sample Comments: Soil Sample

- split sample of URS sample # 02TS-03(0-0.5)-0802
- in trench under rotary furnace 0-6" interval
- brown/gray silty clay/fill material
- MS/MSD extra volume included

Sample collected by: [signature]

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1641 **Sample Number:** 104 **QC Code:** __ **Matrix:** Soil **Tag ID:** 1641-104-__

Activity Number: TFL7YX **Activity Leader:** Lorenz, Tom
Activity Desc: St. Louis (EX) AA Plant sampling
Location: St. Louis **State:** Missouri **Type:** Superfund
Superfund Name: ST LOUIS (EX) ARMY AMMUNITION PLANT - Site Evaluation/Disp **Site ID:** 07YX **Site OU:** 00

Location Desc: split of URS # 07TS-02(0-0.5)-0802

External Sample Number: _____

Expected Conc: Circle One: (Low) Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)
Start 8/2/02 15:35
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial (preserved/tared)	4 Deg C, H2O + sodium bisulfate (in vial)	14 Days	VOC's in Soil at Low Levels by GC/MS Closed-System Purge-and-Trap
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil + PCBs
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS

Sample Comments: Soil Sample

- split sample of URS Sample # 02TS-02(0-0.5)-0802

-

- in trench west of rotary furnace
- brown silty clay/fill material

Sample collected by: [signature]

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1641 **Sample Number:** 105 **QC Code:** __ **Matrix:** Soil **Tag ID:** 1641-105-__

Activity Number: TFL7YX **Activity Leader:** Lorenz, Tom
Activity Desc: St. Louis (EX) AA Plant sampling
Location: St. Louis **State:** Missouri **Type:** Superfund
Superfund Name: ST LOUIS (EX) ARMY AMMUNITION PLANT - Site Evaluation/Disp **Site ID:** 07YX **Site OU:** 00

Location Desc: Split sample of URS # 02TS-09(0-0.5)-0802

External Sample Number: _____

Expected Conc: Circle One: (Low) Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)
Start 8/21/02 16:32
End ___/___/___ ___:___

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial (preserved/tared)	4 Deg C, H2O + sodium bisulfate (in vial)	14 Days	VOC's in Soil at Low Levels by GC/MS Closed-System Purge-and-Trap
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil PCBs

Sample Comments: Soil Sample

- split sample of URS # 02TS-09(0-0.5)-0802
- in trench near near rotary furnace
- brown silty clay/fill material

Sample collected by: [signature]

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1641 **Sample Number:** 107 **QC Code:** FB **Matrix:** Soil **Tag ID:** 1641-107-FB

Activity Number: TFL7YX **Activity Leader:** Lorenz, Tom
Activity Desc: St. Louis (EX) AA Plant sampling
Location: St. Louis **State:** Missouri **Type:** Superfund
Superfund Name: ST LOUIS (EX) ARMY AMMUNITION PLANT - Site Evaluation/Disp **Site ID:** 07YX **Site OU:** 00

Location Desc: 5035 Soil VOA Trip Blank sample

External Sample Number: _____

Expected Conc: Circle One: Low Medium High

Latitude: ___ ___ ___

Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)
Start 8/20/07 12:30
End / / :

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial (preserved/tared)	4 Deg C, H2O + sodium bisulfate (in vial)	14 Days	VOC's in Soil at Low Levels by GC/MS Closed-System Purge-and-Trap

Sample Comments:

- Trip blank

Sample collected by: _____

Sample Collection Field Sheet

US EPA Region VII
Kansas City, KS

ASR Number: 1641 **Sample Number:** 106 **QC Code:** __ **Matrix:** Soil **Tag ID:** 1641-106-__

Activity Number: TFL7YX **Activity Leader:** Lorenz, Tom
Activity Desc: St. Louis (EX) AA Plant sampling
Location: St. Louis **State:** Missouri **Type:** Superfund
Superfund Name: ST LOUIS (EX) ARMY AMMUNITION PLANT - Site Evaluation/Disp **Site ID:** 07YX **Site OU:** 00

Location Desc: split sample of URS# 01SB-04(0-1)-0802

External Sample Number: _____

Expected Conc: Circle One: Low (Medium) High

Latitude: ___ ___ ___
Longitude: ___ ___ ___

Sample Collection: **Date** **Time** (24 Hr)
Start 8/22/02 13:35
End __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial (preserved/tared)	4 Deg C, H2O + sodium bisulfate (in vial)	14 Days	VOC's in Soil at Low Levels by GC/MS Closed-System Purge-and-Trap
1 - 8 oz glass	4 Deg C	365 Days	PCDD/PCDF in Soil by GC/HRMS
1 - 8 oz glass	4 Deg C	14 Days	Semi-Volatile Organic Compounds in Soil + PCBs

Sample Comments: Soil Sample

- split sample of URS sample # 01SB-04(0-1)-0802
- collected from beneath sump in the southwest corner of Bldg 1, 0-6" interval extended to 1' below sump.
- moderate to high petroleum hydrocarbon odor
- 2 extra VOA vials for QC included

Sample collected by: [signature]

LABORATORY CUSTOMER SATISFACTION SURVEY

Thanks for using our services, we would like to hear how we did.
Please take a few minutes and complete the survey and let us know.
Return completed surveys to Dale Bates, ENSV/RLAB.

Name: _____

Division/Branch/Section: _____

ASR Number: 1641 **Date:** _____

Was your data received in a timely manner?					
1	2	3	4	5	
Data was very late		30 day (standard)		Results received before expected	
Was the data usable for its intended purpose?					
1	2	3	4	5	
Of little value		Meets my needs		Exceeded my expectations	
How was communication with the people in the laboratory?					
1	2	3	4	5	☐
Poor and hard to understand		Average		Clear and informative	No communication on this activity
What is your opinion of the RLAB's ability to resolve your problem?					
1	2	3	4	5	☐
Slow and uncaring		Average		Excellent, always available	No problem on this data set
What is your opinion of the process to obtain data (e.g., ASRs, etc.)?					
1	2	3	4	5	
Too much trouble		Neutral		Excellent, indispensable	
What is your confidence in the data results you received?					
1	2	3	4	5	
Troublesome		Acceptable		Very Comfortable	
Comments:					

Code: C

OCT 0 2 2002

United States Environmental Protection Agency

Region VII
901 N. 5th Street
Kansas City, KS 66101

Date: ____/____/_____

Subject: Sample Analysis Results for ASR #: 1641
Activity Number: TFL7YX
Activity Description: St. Louis (EX) AA Plant sampling

From: Tom Lorenz
SUPR/FFSE

To: Dee Simmons
ENSV/RLAB/CATS

I have received and reviewed the Transmittal of Sample Analysis Results for the above-referenced Analytical Services Request (ASR) and have indicated my findings below by checking one of the boxes.

☐ After reviewing the data, I have found that NO CHANGES ARE NECESSARY. Please change the ASR status to 'RELEASED' so that the electronic form of the data are available on the LAN in LIMS Lite for my use. I realize that this will make these results available in read-only form to all Region 7 employees and contractors that have a LIMS Lite 'Customer' account.

☐ After reviewing the data, I have found that NO CHANGES ARE NECESSARY. Please DO NOT change the ASR status to 'Released' as THIS DATA IS OF A SENSITIVE NATURE. I realize that this data will be archived on-line and any future reports or electronic data dumps must be requested through the laboratory.

☐ After reviewing the data, I have found that SOME CHANGES ARE NECESSARY. PLEASE MAKE THE CHANGES DETAILED IN THE ATTACHED LIST and re-transmit this data package. I realize that if I wait more than 14 days after the date on the data transmittal that the data will already be archived and additional time will be required to make these changes.